Aliens There | Applied Kinesiology | Personal Coaches | Chinese Superstitions | The Forbidden City | Global Pandemic

Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

Vol. 44 No. 3 | May/June 2020

THE NOBEL DISEASE

When Intelligent Scientists Go Weird

Humor, Cartoons Fight Antiscience

Science Fiction for Science Communication

The Chase Vault Mystery

Dubious Claims in Youth Psychotherapy, Part III

INTRODUCTORY PRICE U.S. and Canada $5.99

06

0 09281 02614 3

Committee for Skeptical Inquiry www.skepticalinquirer.org

Robyn E. Blumner, President and CEO
Barry Karr, Executive Director
Joe Nickell, Senior Research Fellow
Massimo Polidoro, Research Fellow
Benjamin Radford, Research Fellow
Richard Wiseman, Research Fellow

Fellows

James E. Alcock,* psychologist, York Univ., Toronto
Marcia Angell, MD, former editor-in-chief, *New England Journal of Medicine*
Kimball Atwood IV, MD, physician; author; Newton, MA
Banachek, professional magician/mentalist, magic consultant/producer
Stephen Barrett, MD, psychiatrist; author; consumer advocate, Pittsboro, NC
Robert Bartholomew, sociologist, investigative journalist, Auckland, New Zealand
Irving Biederman, psychologist, Univ. of Southern California
Susan Blackmore, visiting lecturer, Univ. of the West of England, Bristol
Sandra Blakeslee, science writer; author; *New York Times* science correspondent
Mark Boslough, physicist, Albuquerque, NM
Henri Broch, physicist, Univ. of Nice, France
Jan Harold Brunvand, folklorist; professor emeritus of English, Univ. of Utah
Sean B. Carroll, molecular geneticist; vice president for science education, Howard Hughes Medical Institute, Madison, WI
Thomas R. Casten, energy expert, Hinsdale, IL
John R. Cole, anthropologist; editor, National Center for Science Education
K.C. Cole, science writer; author; professor, Univ. of Southern California's Annenberg School of Journalism
John Cook, Center for Climate Change Communication, George Mason University, Virginia.
Frederick Crews, literary and cultural critic; professor emeritus of English, Univ. of CA, Berkeley
Richard Dawkins, zoologist, Oxford Univ.
Geoffrey Dean, technical editor, Perth, Australia
Cornelis de Jager, professor of astrophysics, Univ. of Utrecht, the Netherlands
Daniel C. Dennett, Austin B. Fletcher Professor of Philosophy and director of Center for Cognitive Studies, Tufts Univ.
Ann Druyan, writer and producer; CEO, Cosmos Studios
Sanal Edamaruku, president, Indian Rational ist Association and Rationalist International
Edzard Ernst, former professor of complementary medicine, University of Exeter
Kenneth Feder, professor of anthropology, Central Connecticut State Univ.
Krista Federspiel, science journalist, expert on complementary and alternative medicine, Vienna, Austria.
Kevin Folta, molecular biologist, professor and chair of Horticultural Sciences Department, University of Florida
Barbara Forrest, professor of philosophy, SE Louisiana Univ.
Andrew Fraknoi, astronomer, University of San Francisco
Kendrick Frazier,* science writer; editor, Skeptical Inquirer
Christopher C. French, professor, Department of Psychology, and head of the Anomalistic Psychology Research Unit, Goldsmiths College, Univ. of London
Julia Galef, host of the *Rationally Speaking* podcast; cofounder, Center for Applied Rationality, Berkeley, CA
Luigi Garlaschelli, chemist, Università di Pavia (Italy); research fellow of CICAP, the Italian skeptics group
Maryanne Garry, professor, School of Psychology, Victoria Univ. of Wellington, New Zealand
Susan Gerbic, founder and leader of Guerilla Skepticism on Wikipedia (GSoW) project
Thomas Gilovich, psychologist, Cornell Univ.
David H. Gorski, cancer surgeon and researcher at Barbara Ann Karmanos Cancer Institute and chief of breast surgery section, Wayne State University School of Medicine
Wendy M. Grossman, writer; founder and first editor, *The Skeptic* magazine (UK)
Susan Haack, Cooper Senior Scholar in Arts and Sciences, professor of philosophy, University of Miami
Harriet Hall,* MD, physician; investigator, Puyallup, WA
David J. Helfand, professor of astronomy, Columbia Univ.
Terence M. Hines, prof. of psychology, Pace Univ., Pleasantville, NY
Douglas R. Hofstadter, professor of human understanding and cognitive science, Indiana Univ.
Gerald Holton, Mallinckrodt Professor of Physics and professor of history of science, emeritus, Harvard University
Deborah Hyde, skeptic, folklorist, cultural anthropologist, Editor in Chief, *The Skeptic* (U.K.)
Ray Hyman,* psychologist, Univ. of Oregon
Stuart D. Jordan, NASA astrophysicist emeritus
Barry Karr, executive director, Committee for Skeptical Inquiry, Amherst, NY
Edwin C. Krupp, astronomer; director, Griffith Observatory, Los Angeles, CA
Lawrence Kusche, science writer
Stephan Lewandowsky, psychologist, School of Experimental Psychology and Cabot Institute, Univ. of Bristol, UK
Scott O. Lilienfeld,* psychologist, Emory Univ., Atlanta, GA
Lin Zixin, former editor, *Science and Technology Daily* (China)
Jere Lipps, Museum of Paleontology, Univ. of California, Berkeley
Elizabeth Loftus,* professor of psychology, Univ. of California, Irvine
Daniel Loxton, author; editor of *Junior Skeptic* at *Skeptic* magazine (US); artist, Vancouver, B.C., Canada
Michael E. Mann, Distinguished Professor of Atmospheric Sciences and director of the Earth Systems Sciences Center, Pennsylvania State University
David Marks, psychologist, City Univ., London
Mario Mendez-Acosta, journalist and science writer, Mexico City
Kenneth R. Miller, professor of biology, Brown Univ.
David Morrison, space scientist, NASA Ames Research Center
Richard A. Muller, professor of physics, Univ. of California, Berkeley
Joe Nickell, senior research fellow, CSI
Jan Willem Nienhuys, mathematician, Waalre, the Netherlands
Lee Nisbet, philosopher, Medaille College
Steven Novella,* MD, assistant professor of neurology, Yale Univ. School of Medicine
Bill Nye, science educator and television host, Nye Labs, CEO, The Planetary Society
James E. Oberg, science writer
Paul Offit, professor of pediatrics, director of the Vaccine Education Center, the Children's Hospital of Philadelphia
Naomi Oreskes, geologist and professor, Departments of the History of Science and Earth and Planetary Sciences, Harvard Univ., Cambridge, MA
Loren Pankratz, psychologist, Oregon Health Sciences Univ.
Robert L. Park, emeritus professor of physics, Univ. of Maryland
Jay M. Pasachoff, professor of astronomy and director of Hopkins Observatory, Williams College
John Paulos, mathematician, Temple Univ.
Clifford A. Pickover, scientist; author; editor, IBM T.J. Watson Research Center.
Massimo Pigliucci, professor of philosophy, City Univ. of New York–Lehman College
Steven Pinker, cognitive scientist, Harvard Univ.
Massimo Polidoro, science writer; author; executive director of CICAP, Italy
James L. Powell, geochemist; author; executive director, National Physical Science Consortium
Anthony R. Pratkanis, professor of psychology, Univ. of CA, Santa Cruz
Donald R. Prothero, paleontologist/geologist, Natural History Museum of Los Angeles County, Los Angeles, CA
Benjamin Radford, investigator; research fellow, Committee for Skeptical Inquiry
James "The Amazing" Randi, magician; CSICOP founding member; founder, James Randi Educational Foundation
Milton Rosenberg, psychologist, Univ. of Chicago
Amardeo Sarma,* chairman, GWUP, Germany
Richard Saunders, Life Member, Australian Skeptics; educator; investigator; podcaster; Sydney, Australia
Joe Schwarcz, director, McGill Office for Science and Society
Eugenie C. Scott,* physical anthropologist; chair, advisory council, National Center for Science Education
Seth Shostak, senior astronomer, SETI Institute, Mountain View, CA
Simon Singh, science writer; broadcaster; UK
Dick Smith, entrepreneur; publisher; aviator; adventurer, Terrey Hills, N.S.W., Australia
Keith E. Stanovich, cognitive psychologist, professor of applied psychology, Univ. of Toronto
Karen Stollznow,* linguist; skeptical investigator; writer; podcaster
Jill Cornell Tarter, astronomer, SETI Institute, Mountain View, CA
Carol Tavris, psychologist and author, Los Angeles, CA
David E. Thomas,* physicist and mathematician, Socorro, NM
Neil deGrasse Tyson, astrophysicist and director, Hayden Planetarium, New York City
Indre Viskontas, cognitive neuroscientist; TV and podcast host; opera singer, San Francisco, California
Stuart Vyse, psychologist, former Joanne Toor Cummings '50 professor of psychology, Connecticut College
Marilyn vos Savant, *Parade* magazine contributing editor
Steven Weinberg, professor of physics and astronomy, Univ. of Texas at Austin; Nobel laureate
E.O. Wilson, Univ. professor emeritus, organismic and evolutionary biology, Harvard Univ.
Richard Wiseman, psychologist, Univ. of Hertfordshire, England
Benjamin Wolozin, professor, Department of Pharmacology, Boston Univ. School of Medicine

*Member, CSI Executive Council
(Affiliations given for identification only.)

The Skeptical Inquirer (ISSN 0194-6730) is published bi-monthly by the Center for Inquiry in association with the Committee for Skeptical Inquiry, P.O. Box 703, Amherst, NY 14226. Printed in U.S.A. Periodicals postage paid at Buffalo, NY, and at addition al mailing offices. Subscription prices: one year (six issues), $35; two years, $60; three years, $84; single issue, $5.99. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$10 per year for shipping. Canadian and foreign customers are encouraged to use Visa or Master Card.

Inquiries from the media and the public about the work of the Committee should be made to Barry Karr, Executive Director, CSI, P.O. Box 703, Amherst, NY 14226-0703. Tel.:716-636-1425. Fax: 716-636-1733. Email: bkarr@centerforinquiry.org

Manuscripts, letters, books for review, and editorial inquiries should be sent to Kendrick Frazier, Editor, Skeptical Inquirer, EMAIL: kendrickfrazier@comcast.net. Mail: 944 Deer Drive NE, Albuquerque, NM 87122. Please consult our Guide for Authors for style, reference, and submittal instructions. It is on our website at www.skepticalinquirer.org/article-submission-guidlines/.

Articles, reports, reviews, and letters published in the SKEPTICAL INQUIRER represent the views and work of individual authors. Their publication does not necessarily constitute an endorsement by CSI or its members unless so stated.

Copyright ©2020 by the Center for Inquiry and the Committee for Skeptical Inquiry. All rights reserved.

Subscriptions and changes of address should be addressed to: SKEPTICAL INQUIRER, P.O. Box 703, Amherst, NY 14226-0703 or call toll-free 1-800-634-1610 (outside the U.S. call 716-636-1425). Old address as well as new are necessary for change of address, with ten weeks advance notice. Skeptical Inquirer subscribers may not speak on behalf of CSI or the Skeptical Inquirer.

Postmaster: Send changes of address to Skeptical Inquirer, P.O. Box 703, Amherst, NY 14226-0703.

A PROGRAM OF CENTER FOR INQUIRY

Skeptical Inquirer May/June 2020 | Vol. 44, No. 3

FEATURES

32
The Nobel Disease: When Intelligence Fails to Protect against Irrationality

A surprising number of Nobel laureates in the sciences appear to have embraced decidedly weird ideas. The story of the so-called "Nobel Disease" bears intriguing implications for the field of skepticism.

CANDICE BASTERFIELD, SCOTT O. LILIENFELD, SHAUNA M. BOWES, AND THOMAS H. COSTELLO

38
Using Humor and Games to Counter Science Misinformation

Science is necessary but insufficient to successfully counter science denial. Solutions commensurate with the scale of the problem require the combined efforts of science, art, and technology.

JOHN COOK

42
Multiply Connected: The Expanding Universe of Science Fiction, Science Fact, and Science Communication

Scientists have consulted with science fiction creators for years. Science communicators have interacted with the public for a long time, too. Nowadays, science fiction, science fact, and science communication are becoming more interconnected.

DAVID R. POWELL

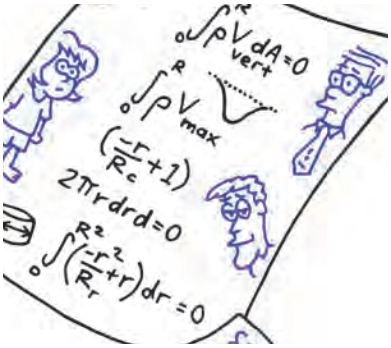
46
Reopening the Chase Vault Mystery

A classic unexplained mystery of restless coffins in Barbados has baffled researchers for centuries. But an onsite investigation—combined with fresh folkloric analysis—may finally put the matter to rest.

BENJAMIN RADFORD

53
Dubious Claims in Psychotherapy for Youth Part III: Externalizing Issues and Daily Routines

STEPHEN HUPP, NATALIE NEWELL, JOE NICKELL, HARRIET HALL, W. BLAKE SMITH, ROBERT S. FELDMAN, MIRANDA MEEKER, AND LEANNA KEHL



COMMENTARY

12
Aliens There but Not Here

SETH SHOSTAK

SPECIAL REPORT

15
ID Movement Still Stymied by Genetic Algorithms: War of the Weasels Update

DAVID E. THOMAS

COLUMNS

FROM THE EDITOR
The Nobel Disease 4

NEWS AND COMMENT
2020 Outbreaks: Coronavirus, Conspiracies, and Misinformation / TV Ghost Hunter Bagans Caught in Plagiarism Scandal / Prometheus Unbound: Publisher of Skeptic, Freethought Books Enters a New Phase / Quackwatch Is Now a Part of the Center for Inquiry 5

INVESTIGATIVE FILES
Secrets of Beijing's Forbidden City
JOE NICKELL 18

REALITY IS THE BEST MEDICINE
Applied Kinesiology and Other Chiropractic Delusions
HARRIET HALL 21

THE SCIENCE OF SCIENCE COMMUNICATION
Tony Robbins Next Door: Personal Coaches Are the New High Priests of Self-Help
MATTHEW C. NISBET 24

BEHAVIOR & BELIEF
Superstition and Real Estate Part 1: The Chinese Market
STUART VYSE 26

SKEPTICAL INQUIREE
Investigating Mothman's Red Eyeshine
BENJAMIN RADFORD 29

NEW AND NOTABLE 60

LETTERS TO THE EDITOR 64

REVIEWS

National Geographic's Name Used to Sell the Supernatural
JOE NICKELL 57
Science of the Supernatural: Dare to Discover the Truth
by Daniel S. Levy

Never Mind
PETER KASSAN 59
The Feeling of Life Itself: Why Consciousness Is Widespread but Can't Be Computed
by Christof Koch

Evolution's Flaws Are in Us
HARRIET HALL 62
Human Errors: A Panorama of Our Glitches, from Pointless Bones to Broken Genes
by Nathan H. Lents

Committee for Skeptical Inquiry
"... promotes scientific inquiry, critical investigation, and the use of reason in examining controversial and extraordinary claims."

[FROM THE EDITOR

The Nobel Disease

Along, long time ago when I was a young staff member at the National Academy of Sciences in Washington, D.C., I found myself sitting at a small office table opposite Nobel laureate physicist William Shockley. Normally, this would be an exciting moment—he was coinventor of the transistor. But it was not. It was awkward. Why? Shockley had recently been publically exposed for his racist views. He had been trying to get the Academy to publish his racist theories, and as an Academy member, he had certain rights. He was, as I recall, awaiting some official deliberations about that, and I didn't know what to say to him. I said nothing.

Shockley is one of the scientists discussed in our cover article, "The Nobel Disease: When Intelligence Fails to Protect against Irrationality." It focuses specifically on certain august scientists who have won the Nobel Prize but then gone on to embrace highly implausible ideas roundly rejected by most scientists because of poor evidence. Neuropsychologist Candice Basterfield of the University of Melbourne, Emory University psychology professor Scott O. Lilienfeld, Shauna M. Bowes, and Thomas H. Costello (the latter two advanced graduate students in psychology at Emory University) provide thumbnail sketches of eight such Nobel laureates: Linus Pauling, Shockley, James Watson, Brian Josephson, Nikolaas Tinbergen, Kary Mullis, Louise J. Ignarro, and Luc Mantagnier. They mention others as well. And of course, other brilliant scientists in history have fallen to the same disease, among them Alfred Russel Wallace and Percival Lowell.

Our longtime psychologist colleague Ray Hyman and others have long warned that scientific preeminence does not guarantee the scientific validity of opinions in fields outside one's own area of expertise. When prominent scientists skirt the processes of peer review (as Shockley was attempting) and use their fame to avoid the rigorous criticisms that mere mortal scientists must undergo, they are prone to the same kinds of errors and fallacious thinking as anyone else.

How does it happen? Partly because highly creative scientists tend to be more self-confident than others. That can lead to intellectual overreach and the feeling that they know more than anyone else.

The episodes have profound lessons for us all, including skeptics. The authors point out that "we should not confuse intelligence with rationality, nor confidence with correctness." And they remind us we should not suspend our scientific skepticism in the face of pronouncements by even the most accomplished scientists. Authority means little in science; evidence is everything.

John Cook, a climate communications researcher and CSI fellow, relates in this issue how he found that humor—cartoons in particular—can be more effective than scientific arguments alone in countering misinformation about climate change. He gives examples of this merging of science, art, and technology. Together they can be far more persuasive in countering misinformation than facts alone.

* * *

As I write, the world is battling a global coronavirus pandemic, with everyday life shut down, deaths mounting, economic losses cascading, and the outcome uncertain. Skeptics have been exposing misinformation and scams (p. 5). Our Center for Inquiry/Committee for Skeptical Inquiry has quickly created an online Coronavirus Resource Center compiling scientific refutations of misinformation and providing accurate scientific information. Look for it online at https://centerforinquiry.org/coronavirus/.

—Kendrick Frazier

Skeptical Inquirer™
THE MAGAZINE FOR SCIENCE AND REASON

EDITOR Kendrick Frazier
DEPUTY EDITOR Benjamin Radford
MANAGING EDITOR Julia Lavarnway
ASSISTANT EDITOR Nicole Scott
ART DIRECTOR Christopher Fix
WEBMASTER Marc Kreidler
PUBLISHER'S REPRESENTATIVE Barry Karr

EDITORIAL BOARD James E. Alcock, Harriet Hall, Ray Hyman, Scott O. Lilienfeld, Elizabeth Loftus, Joe Nickell, Steven Novella, Amardeo Sarma, Eugenie C. Scott, Karen Stollznow, David E. Thomas, Leonard Tramiel

CONSULTING EDITORS Susan J. Blackmore, Kenneth L. Feder, Barry Karr, E.C. Krupp, Jay M. Pasachoff, Richard Wiseman

CONTRIBUTING EDITORS Harriet Hall, David Morrison, Matthew C. Nisbet, Massimo Pigliucci, David E. Thomas, Stuart Vyse

Published in association with
CENTER FOR INQUIRY

CHAIR Edward Tabash
PRESIDENT AND CEO Robyn E. Blumner
CHIEF FINANCIAL OFFICER Barry Karr
CORPORATE COUNSEL Nicholas J. Little, Brenton Ver Ploeg
SUBSCRIPTION DATA MANAGER Jacalyn Mohr
COMMUNICATIONS DIRECTOR Paul Fidalgo
DIRECTOR OF LIBRARIES Timothy S. Binga
EXECUTIVE DIRECTOR, RICHARD DAWKINS FOUNDATION FOR REASON & SCIENCE Robyn E. Blumner
DIRECTOR OF DEVELOPMENT Connie Skingel
DIRECTOR, DIGITAL PRODUCT AND STRATEGY Marc Kreidler
DIRECTOR, GOVERNMENT AFFAIRS Jason Lemieux
SYSTEM ADMINISTRATOR Cody Hashman
DIRECTOR, TEACHER INSTITUTE FOR EVOLUTIONARY SCIENCE Bertha Vazquez

BOARD OF DIRECTORS Edward Tabash (chair), Vinod Bhardwaj, David Cowan, Richard Dawkins, Brian Engler, Kendrick Frazier, Barry A. Kosmin, Bill Maxwell, Y. Sherry Sheng, Julia Sweeney, J. Anderson Thomson Jr., Leonard Tramiel. *Honorary:* Rebecca Newberger Goldstein, Susan Jacoby.

STAFF Pat Beauchamp, Melissa Braun, Matthew Cravatta, Lauren Foster, Roe Giambrone, Melissa Myers, Alexander Nicaise, Paul Paulin, Michael Powell, Vance Vigrass

cfi CENTER FOR INQUIRY

CFI Mission: The Center for Inquiry strives to foster a secular society based on reason, science, freedom of inquiry, and humanist values.
Our Vision: A world where people value evidence and critical thinking, where superstition and prejudice subside, and where science and compassion guide public policy.
Our Values: Integrity, Courage, Innovation, Empathy, Learning, and Wonder.

2020 Outbreaks: Coronavirus, Conspiracies, and Misinformation

Benjamin Radford

In the first few months of 2020, a new and deadly disease killed and quarantined thousands, panicked millions, and made international news. The new virus, dubbed COVID-19 or 2019-nCoV, is a type of coronavirus; two of the best known and most deadly are SARS (severe acute respiratory syndrome, first identified in 2003) and MERS (Middle East respiratory syndrome, in 2012). The symptoms of 2019-nCoV are typical of influenza and include a cough, sometimes with a fever, shortness of breath, nausea, vomiting, and/or diarrhea. About 80 percent of infected patients recover within a week or two, like with a bad cold, and 20 percent contract severe infections such as pneumonia, sometimes leading to death.

The 2019-nCoV virus is spreading faster than either MERS or SARS, but it's much less deadly than either. The death rate for 2019-nCoV is 2 percent, compared to 10 percent for SARS and 35 percent for MERS. There's no vaccine, and because it's not bacterial, antibiotics won't help. The first case was reported in late December 2019 in Wuhan, China. About a month later, a U.S. public health emergency was announced.

In addition to sickened patients, quarantines, and outbreaks, epidemiologists were dealing with an outbreak of rumor and misinformation about the virus. It didn't help that Chinese officials were slow to share information and admit the scope of the outbreak, due in part to the government's longstanding policies of restricting news reporting.

Xenophobia and contamination fears are common in disease rumors. Many reports in news media and social media focus on the "other," the dirty aberrant outsiders who "created" or spread the menace.

In the case of 2019-nCoV, rumors suggested that seemingly bizarre eating habits of the Chinese were to blame, specifically consuming bat meat. More recent investigation suggests that an endangered animal, the pangolin, might be responsible, but epidemiologists haven't definitively found the origin.

Then there are conspiracies, prominent among them about the disease's origin. Several are circulating, claiming, for example, that 2019-nCoV is a bioweapon either intentionally deployed or escaped/stolen from a secure laboratory. In late February, Arkansas senator Tom Cotton gave credence to it in an interview with Fox News, suggesting that 2019-nCoV might have been "a deliberate release" from a top-secret bioweapons laboratory in Wuhan. (He later admitted that he had no evidence and that it was merely one of many theories he thought he'd share.)

Many of the 2019-nCoV rumors and myths concerned ways to prevent or cure the virus. They include avoiding spicy foods, eating garlic, and drinking a "miracle mineral solution," 28 percent sodium chlorite mixed in distilled water, being sold online for about $30 for a four-ounce bottle. Skeptics have debunked this substance for many years, noting that the solution is not only ineffective but potentially harmful.

Folk remedies such as these are appealing because they are something that victims (and potential victims) can do—some tangible way they can take action and assume control over their own health and lives. When people are frightened by diseases, they cling to any information and often distrust official information. These fears are amplified by the fact that the virus is of course invisible to the eye and fueled by ambiguity and uncertainty about who's a threat, because carriers may be asymptomatic.

Even debunked psychic Sylvia Browne got in on the act, albeit posthumously. In early March, information circulated online about a prediction she made in her 2008 book *End of Days*:

> In around 2020 a severe pneumonia-like illness will spread throughout the globe, attacking the lungs and the bronchial tubes and resisting all known treatments. Almost more baffling than the illness itself will be the fact that it will suddenly vanish as quickly as it arrived, attack again ten years later, and then disappear completely.

This led to many on social media assuming that Browne had accurately predicted the Covid-19 outbreak. I wrote an online piece (at https://tinyurl.com/wpa39hu) analyzing her prediction—which later was quoted in a *Newsweek* article—noting for example that "around 2020" covers about seven years; the virus is not "a severe pneumonia-like illness" nor does it "resist all known treatments"; and for that matter, it hasn't "suddenly vanished as quickly as it arrived" (and we can't know for another decade whether it returns). I concluded that we have a two-sentence prediction written in 2008 by a convicted felon with a long track record of failures. Half of the prediction (the second sentence) has demonstrably not happened. The other half of the prophecy describes an infectious respiratory illness that does not resemble Covid-19 in its particulars that would happen sometime within a few years of 2020.

Hoaxes, misinformation, and rumors can cause real harm during public health emergencies. When people are sick or desperately afraid of a scary disease, any information will be taken seriously by some people. False rumors can not only kill but hinder public health efforts. The best advice is to keep threats in perspective, recognize the social functions of rumors, and heed advice from medical professionals instead of your friend's friend on Twitter.

TV Ghost Hunter Bagans Caught in Plagiarism Scandal

Benjamin Radford

Zak Bagans, the star of popular "reality" ghost hunting show *Ghost Adventures* and owner of a Las Vegas haunted house featuring allegedly cursed objects, was revealed in January to have plagiarized his new book.

Researcher Kenny Biddle discovered the plagiarism when reviewing *Ghost Hunting for Dummies*, credited solely to Bagans. Biddle discovered extensive plagiarism from at least twenty uncredited sources, including almost an entire chapter taken from Skeptical Inquirer's own Joe Nickell, from his book *Camera Clues: A Handbook for Photographic Investigation*. Biddle published his findings in a January 29 online article titled "Ghost Hunting for Dummies by Zak Bagans—and Many Others" (see https://tinyurl.com/wcpek6y).

The investigation took an unexpected twist when one of the authors whose work most prominently appears uncredited in the book, Troy Taylor, wrote:

> I would like to thank Zak Bagans for allowing me the opportunity to assist him in conducting research for his book, *Ghost-Hunting for Dummies*. … I agreed to serve as an uncredited researcher … [and] take full blame for neglecting to appropriately attribute references to some of these sources, owing to the extremely tight deadline given to Zak to finish this book. I must emphasize that this was NOT in any way Zak's fault; it was completely mine. The publisher is already printing new copies of *Ghost-Hunting for Dummies* to ensure that appropriate credit is given.

This seems like a thinly veiled attempt by Taylor to shield the much more prominent Bagans from blame (and/or potential copyright infringement lawsuits), but the fact remains that whoever really wrote *Ghost Hunting for Dummies*—whether Zak Bagans, Troy Taylor, or some unknown ghost writer—plagiarized other people's work.

Biddle responded in a follow-up February 6 article (see https://tinyurl.com/vbobsdo) noting that when he had originally contacted Taylor about the plagiarism, Taylor stated, in part, "I already knew about it and this was a battle I actually won. I received a substantial payment for this. Whoever the ghost writer was (and you KNOW it wasn't him [Bagans]) used a ton of material but I got a settlement from it and let it stand."

Researcher Kenny Biddle discovered the plagiarism when reviewing *Ghost Hunting for Dummies*.

Though future editions of the book may (or may not) have the material correctly attributed, Biddle noted that "references and attributions are for quotes or small sections of another's work that you're building upon or critiquing—not when you outright copy pages worth of material you don't credit. Adding references after the fact does not fix the issue."

After several requests for clarification, a representative for the publisher, Wiley, responded, "We take these matters very seriously and have already taken action, including adding appropriate source information. These changes will be reflected in the eBook and in the print version at the next printing."

Benjamin Radford is deputy editor of the Skeptical Inquirer.

Prometheus Unbound: Publisher of Skeptic, Freethought Books Enters a New Phase

Kendrick Frazier

The reports from friends in Amherst, New York, in early June 2019 were unsettling. Prometheus Books, the courageous independent publisher of noteworthy books on skepticism, humanism, philosophy, science, and religion founded by philosopher Paul Kurtz, was "shutting down." Retiring employees were not being replaced. The office doors at its headquarters on John Glenn Drive in Amherst were closed. Books in its voluminous warehouse there were seen being trucked away.

Then on June 18, in an email letter to "Dear Valued Authors," came the official word and explanation from Jonathan Kurtz, president of Prometheus Books. (He had succeeded his father in that position in 2005.) Prometheus Books was not going away, he reported, but its business status had changed dramatically.

Rowman & Littlefield Publishing Group, another independent publisher of books in the humanities and social sciences based in Lanham, Maryland, just outside of Washington, D.C., had acquired Prometheus Books, and it would now become an imprint of Rowman & Littlefield. On July 1, Rowman & Littlefield would become the "vendor of record" for all Prometheus Books titles. Prometheus Books' backlist of 1,700 active books would be shipped to a new warehouse in Pennsylvania.

Kurtz's email pointed out that the publishing industry has "faced steep challenges on all sides" and that the move to Rowman & Littlefield was meant "to ensure the legacy and future of Prometheus Books will carry on." He said Prometheus Books and Rowman & Littlefield had a twenty-five-year-long friendship, and "we are eager to now enter into this partnership together." His note said that he and acquiring editor Jake Bonar would make this transi-

tion with the press.

"I am looking forward to preserving our traditions while shepherding in a new era for Prometheus. We will continue to acquire, strengthen, and develop our list, delivering your high-quality titles to the reading public." Kurtz is now executive editor of Prometheus Books, an imprint of Globe Pequot, of Guilford, Connecticut, the trade division of Rowman & Littlefield.

Thus ended a fifty-year period of Prometheus Books as essentially a family-owned independent publisher known for publishing books by eminent skeptics critiquing paranormal and pseudoscientific claims and by scientists and scholars critiquing religion and examining a wide variety of philosophical questions.

So Prometheus Books changes but continues, now an imprint of another publisher.

Jonathan Kurtz assures the Skeptical Inquirer that Prometheus Books "is still publishing all the same material it always has had." He adds, "The great thing about R&L are their resources and commitment to keeping things in print and promoting them. I am actively looking for popular science titles."

He said would-be authors can contact him or Jake Bonar at their new email addresses: jkurtz@rowman.com and jbonar@rowman.com. Prometheus Books' web address is http://prometheusbooks.com, but it didn't seem to be fully functional yet when checked in late February.

Kurtz emphasizes that Prometheus Books is now part of one of the largest independent publishing houses. According to its website, Rowman & Littlefield is also one of America's largest book distributors, the National Book Network. A quick scan of Prometheus Books titles on the Rowman & Littlefield website finds many of the old titles still available. New works are under way. So perhaps all will be well.

Yet it's hard not to take some special notice of this new phase in the existence of a publisher that for decades has been central to the intellectual status of the skeptic movement, as well as to intellectuals and scholars in many fields and freethinkers everywhere.

Philosophy professor Paul Kurtz of the State University of New York (SUNY) at Buffalo founded Prometheus Books in 1969. Its intent was always to publish nonfiction works that challenged readers in a variety of categories. Through its existence, it has been known for publishing books other publishers wouldn't touch.

In 1975, it published *Objections to Astrology*, a booklet containing two articles and the famous statement by 192 leading scientists, including nineteen Nobel laureates, disavowing astrology. Kurtz and University of Arizona astronomy professor Bart Bok spearheaded the statement. At a time of credulous belief in astrology, the statement (first published in *The Humanist*, which Kurtz then edited) generated worldwide publicity and controversy. The interest it created—and the scientists' concerns behind it—were among the factors that led Kurtz, in May 1976, to found CSICOP, the Committee for the Scientific Investigation of Claims of the Paranormal, now the Committee for Skeptical Inquiry (CSI), and Skeptical Inquirer magazine. America was awash in paranormal and fringe-science claims that deserved scientific scrutiny. Prometheus Books went on to publish at least five other books critiquing astrology and began taking on all the other fringe-science fads.

Prometheus Books was not going away, Jonathan Kurtz reported, but its business status had changed dramatically.

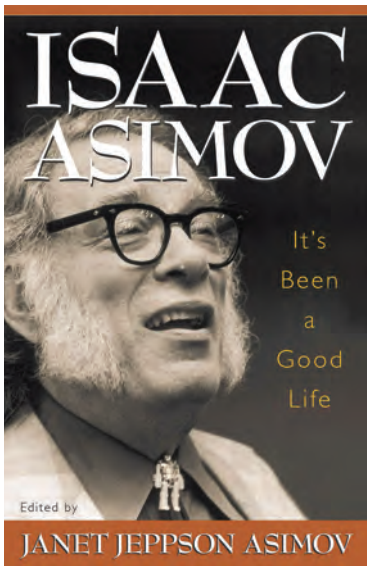
Paul Kurtz, founder of Prometheus Books

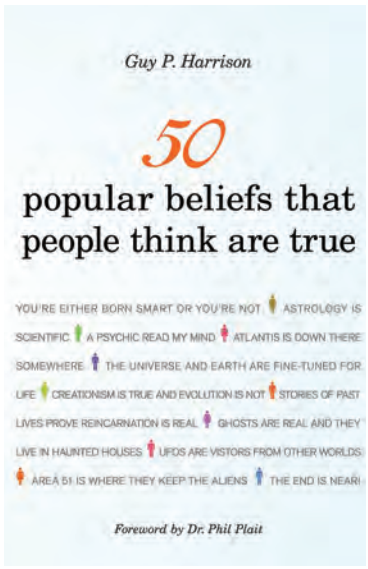
Kurtz subsequently founded the Council for Secular Humanism (CSH) and the Center for Inquiry (CFI), which now includes CSI, CSH, and the Richard Dawkins Foundation for Reason & Science. He not only built Prometheus Books' booklist and its headquarters in Amherst, but he also led the fundraising effort in the 1990s to build CFI's current headquarters building across the street from SUNY at Buffalo, where SI is published.

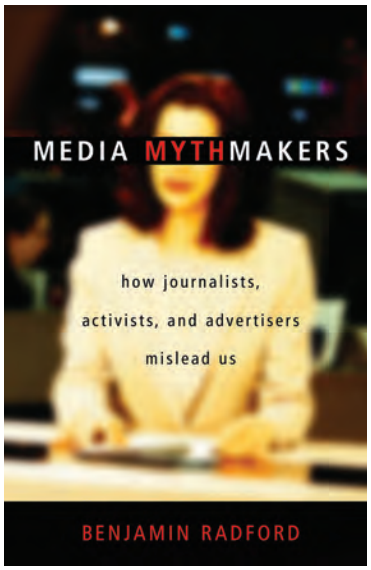
The importance of Prometheus Books' determination to publish skeptical books, then mostly unpopular with general publishers, is hard to overestimate.

Prometheus Books published Martin Gardner's *Science: Good, Bad, and Bogus* (1981, 1989, the sequel to his classic *Fads and Fallacies in the Name of Science*), and many of Gardner's subsequent books (half a dozen of them containing his Skeptical Inquirer columns). Prometheus Books published two editions of Isaac Asimov's *The Roving Mind* (1983, 1997), a collection of essays Asimov dedicated "To the good people of the Committee for the Scientific Investigation of Claims of the Paranormal, an island of sanity in a sea of nonsense." It later published a posthumous Asimov memoir, *It's Been a Good Life* (2002). Prometheus Books published James Randi's *The Truth About Uri Geller* (1982), the revised, paperback edition of Randi's *Flim-Flam* (1982), his *The Faith Healers* (foreword by Carl Sagan, 1987), and *The Mask of Nostradamus* (1993).

It also published many of Paul Kurtz's own books on skepticism, notably his 727-page *A Skeptic's Handbook of Parapsychology* (1985), *The Transcendental Temptation* (1986, 1991, perhaps Kurtz's most important book), *The New Skepticism* (1992), *Skeptical Odysseys*




Guy P. Harrison
50
popular beliefs that people think are true
YOU'RE EITHER BORN SMART OR YOU'RE NOT
ASTROLOGY IS SCIENTIFIC
A PSYCHIC READ MY MIND
ATLANTIS IS DOWN THERE SOMEWHERE
THE UNIVERSE AND EARTH ARE FINE-TUNED FOR LIFE
CREATIONISM IS TRUE AND EVOLUTION IS NOT
STORIES OF PAST LIVES PROVE REINCARNATION IS REAL
GHOSTS ARE REAL AND THEY LIVE IN HAUNTED HOUSES
UFOS ARE VISITORS FROM OTHER WORLDS
AREA 51 IS WHERE THEY KEEP THE ALIENS
THE END IS NEAR!
Foreword by Dr. Phil Plait



(2001), and *Exuberant Skepticism* (2010). Yet Kurtz was so prolific an author he also used other publishers as well.

It published noted aviation journalist and UFO debunker Philip J. Klass's last three books, *UFOs, the Public Deceived* (1983), *UFO Abductions: A Dangerous Game* (1998, revised 1999), and *The Real Roswell Crashed-Saucer Coverup* (1997); Robert Sheaffer's *UFO Sightings: The Evidence* (1998); Kal K. Korff's *The Roswell UFO Crash* (1997), Karl T. Pflock's *Roswell: Inconvenient Facts and the Will to Believe* (2001); and, important to us, *The UFO Invasion* (1998), an anthology of major Skeptical Inquirer articles examining claims of UFOs, Roswell, alien abductions, and government cover-ups.

Through its existence, Prometheus Books has been known for publishing books other publishers wouldn't touch.

Prometheus Books published a whole series of books examining psychics and parapsychological claims. They include David Marks's *The Psychology of the Psychic* (1980, 2001), Ray Hyman's *The Elusive Quarry* (1989), Graham Reeds's *The Psychology of Anomalous Experience* (1988), James Alcock's *Science and Supernature* (1989), and Victor J. Stenger's *Physics and Psychics* (1990) and *The Fallacy of Fine-Tuning* (2011), plus many of Stenger's physics-based critiques of religion. It published two editions of Terence Hines's *Pseudoscience and the Paranormal* (1988, 2003), and Robert L. Park's *Superstition* (2008), plus Richard Wiseman's *Guidelines for Testing Psychic Claimants* (1995) and *Deception and Self-Deception* (1997), Henry Gordon's *Extrasensory Deception* (1987), and Melvin Harris's *Investigating the Unexplained* (1986). It also published Susan Blackmore's *The Adventures of a Parapsychologist* (1986) and *In Search of the Light* (1996).

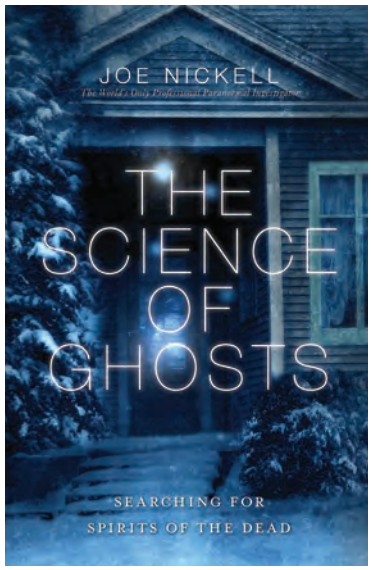
Prometheus Books was the main publisher of books by Steve Allen, the famous TV entertainer and public intellectual, most notably Allen's *Dumbth* (1998) about the lost art of thinking.

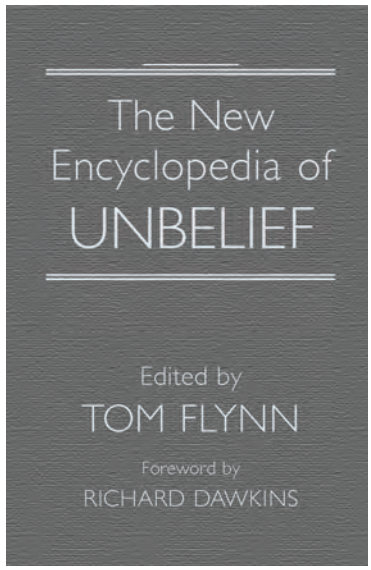
In 1983, it published renowned journalism educator Curtis D. MacDougal's massive 616-page *Superstition and the Press*, a devastating critique of what newspapers over the years have told their readers about ESP, astrology, spiritualism, UFOs, ghosts, monsters, sea serpents, and other supposed supernatural phenomena. Twenty years later, it published Benjamin Radford's *Media Mythmakers* (2003), detailing how news media often offer entertainment and sensationalism instead of significant information.

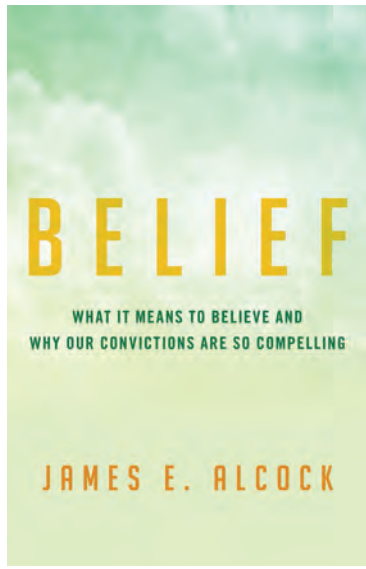
Prometheus Books has also been Joe Nickell's main publisher (in addition to the University Press of Kentucky). Nickell's many Prometheus Books titles about his investigations include his seminal *Inquest on the Shroud of Turin* (1983, 1987) and later books on entities, secrets of the supernatural, miracles, psychic sleuths, mysterious realms, man-beasts, and more recently *The Science of Ghosts* (2012), and *The Science of Miracles* (2013). It has published several books by sociologist and investigator Robert Bartholomew, including *Hoaxes, Myths, and Manias* (with Benjamin Radford, 2003), *A Colorful History of Popular Delusions* (2015), and most recently *American Intolerance* (2018). It has published two of investigator Massimo Polidoro's books, *Final Séance* (2001, about Houdini and Arthur Conan Doyle) and *Secrets of the Psychics* (2003).

In recent years, it has published several of Guy P. Harrison's fine works on critical thinking, such as *50 Popular Beliefs That People Think Are True* (2012), *Think* (2013), and *Good Thinking* (2015).

Prometheus Books published Larry Kusche's updated classic *The Bermuda Triangle Mystery Solved* (1995), Barry and Dale Beyerstein's critique of graphology *The Write Stuff* (1992), Jim







Schnabel's critical take on crop circles, *Round in Circle*s (1994), and two of Robert A. Baker's well-informed critiques of hypnosis, *They Call It Hypnosis* (1990) and *Hidden Memories* (1992).

It published two massive encyclopedias, *Encyclopedia of the Paranormal* (ed. by Gordon Stein, 1996) and *The New Encyclopedia of Unbelief* (ed. by Tom Flynn, foreword by Richard Dawkins, 2007). They are filled with scholarly entries on every topic SI, CSI, CSH, and CFI deal with.

Prometheus Books has also published fine works on the history and philosophy of science, including Arthur N. Strahler's *Understanding Science* (1992), Michael Ruse's *But Is It Science?* (1996) and *Philosophy of Biology* (1998), Susan Haack's *Defending Science—within Reason* (2003) and *Putting Philosophy to Work* (2013), Steven Bertman's *The Genesis of Science* (2010), Istvan Hargittai's *Drive and Curiosity* (2011), Stuart Jordan's *The Enlightenment Vision* (2012), Dennis Trumble's *The Way of Science* (2013), Keith Parsons's *It Started with Copernicus* (2014), and Demetris Nicolaides's *In the Light of Science* (2014), plus Paul Kurtz's own last book, *The Turbulent Universe* (published posthumously in 2013).

And in 2018, Prometheus Books published James E. Alcock's epic 638-page *Belief*, examining what it means to believe and why our convictions are so appealing. That same year in defending reason in a free society, it took on the worsening problem of antiscience with *Anti-Science and the Assault on Democracy*, a collection of essays edited by political scientists Michael J. Thompson and Gregory R. Smulewicz-Zucker.

Last, but hardly least, Prometheus Books is the publisher of five husky multi-topic anthologies of Skeptical Inquirer articles, edited by yours truly, starting with *Paranormal Borderlands of Science* (1981). Then came *Science Confronts the Paranormal* (1986), *The Hundredth Monkey* (1991), *Encounters with the Paranormal: Science, Knowledge, and Belief* (1998), and *Science Under Siege* (2009). Hundreds of SI articles have gained permanence within these books' covers. All are still in print, except, ironically, the most recent.

Prometheus Books helped bring a prominence and respectability to scientific skepticism during the past five decades that wouldn't have otherwise been possible.

So you can see why it is that the worldwide skeptic community owes a big debt to Prometheus Books. It published great works of skepticism and critical analysis of paranormal, pseudoscientific, and extraordinary claims in high frequency at times when most mainstream publishers eschewed them. It helped bring a prominence and respectability to scientific skepticism during the past five decades that wouldn't have otherwise been possible. In recent years, Prometheus Books has tended away from critiques of paranormal claims and pseudoscience in favor of straight science books (while other publishers such as Oxford, Basic, Chicago, MIT, and Columbia have helped fill that gap), but it has continued to publish books on the brain, belief, and scientific thinking.

Prometheus Books has been so important in these regards that any change in its status is a legitimate concern for all skeptics and science-minded inquirers, authors, and readers. We can only hope that in its new incarnation as an imprint, it will continue to publish and promote fine books that extoll science, scientific thinking, and the scientific examination of extraordinary claims.

Kendrick Frazier is editor of the Skeptical Inquirer. His first appearance in a book published by Prometheus Books came when he contributed an invited chapter to *ExtraTerrestrial Intelligence* (ed. James L. Christian, 1976); he was then editor of *Science News*.

Quackwatch Is Now a Part of the Center for Inquiry

Paul Fidalgo

Dr. Stephen Barrett's famed Quackwatch.org website is now a part of the Center for Inquiry (CFI).

For many years, Quackwatch.org and its related websites have been an indispensable and trusted resource in the fight to expose the fraud of health-related pseudoscience and fake medicine. Quackwatch houses an exhaustive array of information, advice, and news for consumers, activists, media, regulatory agencies, and health professionals. Most of the sites are topic-specific and focus on such subjects as diet fads, naturopathy, acupuncture, chiropractic, homeopathy, phony cancer treatments, and questionable medical devices.

To ensure that the information remains available, Quackwatch has become part of CFI, which will maintain its sites and receive Dr. Barrett's research library later this year. Barrett, a physician and longtime fellow of the Committee for Skeptical Inquiry (CSI), started the site decades ago to alert consumers to quackery and other medical misinformation.

CFI is home to Skeptical Inquirer magazine and CSI, which seeks to promote science-based skepticism and an end to pseudoscience wherever it arises.

"Dr. Barrett's contribution to the fight against the fraud of fake medicine and snake oil cannot be overstated," said Robyn E. Blumner, president and CEO of CFI. "The Quackwatch network has been an invaluable source for evidence-based evaluations of pseudoscientific claims for a generation, and we are proud that it will now be part of the CFI family."

Quackwatch is an outgrowth of Barrett's anti-quackery activities that began with the formation of a nonprofit that was incorporated in 1970 as the Lehigh Valley Committee Against Health Fraud (Allentown, Pennsylvania). In 1997, as the internet developed, Barrett changed the corporation's name to Quackwatch, Inc., and began developing a worldwide network of volunteers and expert advisors. In 2008, after Barrett moved to North Carolina, Quackwatch, Inc., was dissolved and is no longer a legal entity. But Barrett has continued the same activities, and people throughout the world who share his concerns have continued to supply information and offers of help.

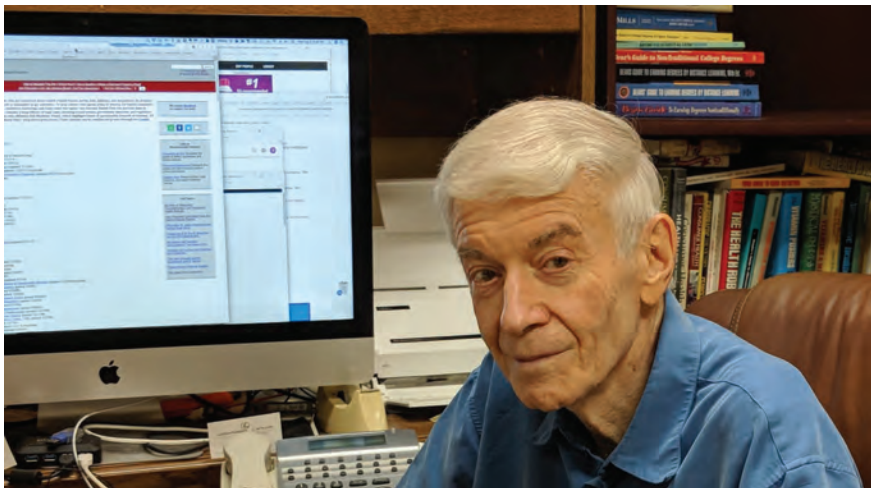
Quackwatch
Your Guide to Quackery, Health Fraud and Intelligent Decisions

Quackwatch.org and its related websites have been an indispensable and trusted resource in the fight to expose the fraud of health-related pseudoscience.

Since its founding, Quackwatch postings have been cited and recommended by innumerable news publications, medical organizations, media outlets, books, and journals. Barrett has also assisted with consumer-protection lawsuits and offered advice to victims of health-related fraud. He's editor and lead author of the book *The Health Robbers*. He still publishes a free weekly email newsletter, *Consumer Health Digest*.

CFI is currently waging consumer-protection lawsuits against Walmart and CVS for their deceptive practices in the sale and marketing of homeopathic products. CFI has also been at the forefront of the push to strengthen vaccination requirements and prevent alternative medicine practitioners from being given primary care authority by state legislatures.

"CFI has always been committed to exposing the lies of unscientific treatments, from homeopathy to faith-healing, and with the rising influence of the anti-vaccine movement and celebrity 'wellness' hucksters, the mission we share with Dr. Barrett has never been more crucial," said Blumner. "Quackwatch will have a very good home with us."



Dr. Stephen Barrett, Quackwatch founder

Paul Fidalgo is the communications director of the Center for Inquiry.

CFI AT A GLANCE: The Center for Inquiry's expanding family of programs and projects, including the Committee for Skeptical Inquiry, Skeptical Inquirer, and CSICon, and showing the recent additions of Quackwatch (see story on p. 10) and the CFI Investigations Group.

Aliens There but Not Here

SETH SHOSTAK

Despite the beliefs of many people, scientists have yet to find any compelling evidence for life beyond Earth. But that doesn't mean we're alone. If our world is the only place where biology exists, then life isn't a frequent product of natural processes; it's a miracle.

The support for this daring statement is simple. In the past two dozen years, astronomers have discovered that planets are more common than cheap burger joints. Our galaxy shelters approximately a trillion planets, and the visible universe is home to two trillion other galaxies. Unless you're vain enough to believe that Earth is idiosyncratic and exceptional in some important way, it's reasonable to expect that life is widespread.

In the past two dozen years, astronomers have discovered that planets are more common than cheap burger joints.

Almost all contemporary efforts to discover extraterrestrial biology have been directed to finding it elsewhere in our solar system—on Mars or beneath the frozen surfaces of some of the moons of Jupiter or Saturn. NASA and other space agencies are hunting on these worlds for microbes, the only life forms that can withstand their harsh environments.

But a few dozen scientists, operating with private funding, are listening for radio signals coming from much farther away—signals that would prove the existence of something more clever than extraterrestrial pond scum. They hope to find evidence of intelligent beings living in other star systems. This experiment is called SETI, the Search for Extraterrestrial Intelligence, and its prey are the real-life equivalents of the dark-eyed aliens who frequently grace the imagery of movies and television. Decades of polls have shown that the majority of Americans (and anyone else who's asked) feel confident that such sentient beings, friendly or otherwise, are out there (Lampert 2017).

However, there's a nasty controversy that plays counterpoint to these listening efforts. Roughly one-third of the populace feels that SETI practitioners are ignoring the obvious. There's no need to plumb the far reaches of space for cosmic company, because the aliens are right here on Earth, tripping through the troposphere in craft reported as UFOs (Whalen 2019). The intent of these presumed aliens is unclear, but they are apparently happy to dazzle military pilots with aeronautical acrobatics and occasionally pluck people from their bedrooms for probing and prodding.

The pages of this magazine routinely feature analyses of the more intriguing

UFO reports and in particular to what degree the evidence offered is of decent quality. But in addition to these detailed investigations, it's fair to ask if the basic assumptions made by the UFO crowd are reasonable. Specific claims aside, does it make sense to think that our planet is hosting visitors from light-years away? After all, the folks who think so are not totally goofy: They're not suggesting an obvious violation of physics, nor are they in the same camp as, for instance, those who would claim a cure for cancer based on a homeopathic regimen.

Some Difficult Difficulties

Despite the fact that it's physically possible, rocketing from one star system to another either requires that passengers have the patience of Job or that spacecraft designers can somehow muster the enormous reserves of energy necessary to cross light-years of distance in a reasonable time—preferably before the crew dies. NASA's fastest rockets clip along at ten miles per second, a speed that would take you from San Francisco to New York in three minutes or to the Moon's cratered crust in as little as eight hours. But using such hardware to visit even the nearest other star system would be a wearying slog—80,000 years—a long time to spend eating miniature pretzels and watching third-run movies.

You could cut this tedious travel to a more reasonable ten years by building a much faster vehicle. And thanks to special relativity, the on-board crew would benefit from a modest slowdown in aging if you did so. But such a craft would require 100 million times as much energy as a NASA rocket to get up to speed. This is a physics problem, not an engineering one, and it's not easy to solve.

There's additional fine print. High-velocity travel though space means bulldozing through the dust and gas that bathe our galaxy at a blistering pace, turning it into tiny bullets that will pierce the hull of any rocket and quickly dispatch the biology within.

UFO fans counter these dispiriting arguments against anyone boldly going to other star systems by saying that the aliens are using physics that we don't yet know. Presumably, extraterrestrial visitors have mastered something akin to warp drive or breaking into hyperspace. Savvy readers will recognize that this is akin to claiming that while scientists don't understand how wispy ectoplasm works, that's irrelevant because ghosts do. But the point is that whatever the details of a particular UFO report, the idea of cosmic creatures on a jaunt to Earth is, *a priori*, suspect.

SETI's prey are the real-life equivalents of the dark-eyed aliens who frequently grace the imagery of movies and television.

A Matter of Timing

Aside from the transport problem, there's an additional puzzle about the UFO hypothesis that's seldom recognized; namely, why are the aliens visiting now? After all, Earth has a four-billion-year history, and *Homo sapiens* has been shuffling around for 300,000 years. You can't credibly maintain that the extraterrestrials have been here all that time. Many thousands of UFOs are currently reported in the United States each year (McClure 2019), but fast-moving objects in the sky were not a thing even as recently as the nineteenth century. Why is the post-war generation the first and apparently the only one to host extraterrestrial beings—cosmic visitors who've come to disturb us with their aerial antics and their unholy interest in our private parts?

In my experience, the most common answer given by those partial to the UFO idea is that the aliens are here now because they're concerned about our development of nuclear weapons or our affronts to the climate and environment. One could argue that such suggestions are suspiciously anthropocentric; after all, why weren't the aliens upset by the Romans' subjugation of the peoples of Europe two millennia ago?

But a stronger rebuttal is simply to note that the extraterrestrials don't know of any of this bad behavior. The only way they could be aware of such matters is by picking up our broadcasts, which inevitably belch information about our society into space at the speed of light. However, those unintentional messages have been launched only since the Second World War, with the development of FM radio, television, and (most notably) radar. Transmissions before the war were generally at low frequencies that would be refracted by our ionosphere.

In other words, we turned on the porch light a mere seventy-five years ago. And because spacecraft are limited to the speed of light by Einstein's cosmic rules, it means that any barnstorming visitors could not have come from more than thirty-seven light-years away. If you're inclined to believe reports from, say, the 1940s—including the celebrated Roswell incident—then there's a real problem: There wasn't enough time for aliens even from the nearest other stellar system to pick up signals from Earth and highball to the New Mexico desert soon enough to spiral into the dirt near Roswell.

The simple fact is that there are fewer than two thousand stars within thirty-seven light-years. It beggars belief to say that the cosmos is so densely packed with aliens that some are camped out so near to us. If you assume that there are between one and 100 million alien societies in our home galaxy now (an optimistic estimate), then the closest would be a few hundred light-years' distant. They won't know about us. They won't be aware of our penchant to risk self-destruction, our fascination with football, or any other thing about our species. This is the basis of the "Why are they here now?" dilemma.

Specific claims aside, does it make sense to think that our planet is hosting visitors from light-years away?

It's All a Bit Provincial

A final bothersome aspect of the UFO phenomenon is that these putative visitors are picky about their travel itineraries, usually choosing to buzz the United States or Europe. The aliens don't seem to have much interest in landing on the White House lawn, although they have famously done so in the movies (Influence of the Media 2020), but apparently prefer to frequent less urbanized locales. UFO lore speaks of them jetting through the open skies of the American Southwest or hanging around our cold-war missile silos.

Admittedly, this penchant for avoiding high-density areas could be a consequence of selection effects, either in the reports or the degree to which they're publicized. But the idea that the aliens favor developed nations is useful in connection with a currently fashionable belief of UFO proponents: namely, that we are on the cusp of "disclosure." According to this hopeful aspiration, proof that Earth really hosts extraterrestrials is about to be made public by the federal government.

This seems fishy for at least two reasons: (1) it presumes that the U.S. government has been able to keep the matter of extraterrestrial presence quiet for seventy years or more, an unprecedented feat of secrecy; and (2) it requires that the 192 other countries on this planet have either been boycotted altogether by the aliens or have—like the Americans—also been covering everything up. Such a worldwide, cooperative conspiracy would be stunning and unprecedented (see "The Phantom Menace of UFO Revelation" in the July/August 2018 Skeptical Inquirer).

In the end, the question of whether UFOs are truly interstellar spacecraft needs to be addressed by careful examination of the claims, an activity that's often documented in the pages of this publication. But it's also the case that—as we've argued—there are good reasons to be skeptical that aliens have come to Earth just in time for our generation to host them, even aside from the particulars of any specific report.

The ability of SETI to find a verifiable signal from the stars that would prove there's someone (or something) out there is improving rapidly, and it's hardly inconceivable that we will soon learn that aliens really do populate the cosmos. What that discovery would do to the UFO ecosystem is unclear. But meanwhile, there seems little reason to tell the Federal Aviation Administration that they are failing to adequately control our airspace. ■

References

Influence of the Media. 2020. The day the Earth stood still. *Encyclopedia of the Unusual and Unexplained*. Available online at http://www.unexplainedstuff.com/Invaders-from-Outer-Space/The-Influence-of-the-Media-The-day-the-earth-stood-still-1951.html.

Lampert, Martijn. 2017. Majority of humanity say we are not alone in the universe. Glocalities.com survey. Available online at https://glocalities.com/latest/reports/majority-of-humanity-say-we-are-not-alone-in-the-universe.

McClure, Kerry. 2019. March 2019 UFO Stats. MUFON. Available online at https://www.mufon.com/feed.

Whalen, Andrew. 2019. Are aliens real? One-third of Americans think alien UFOs have visited Earth. *Newsweek* (February 19). Available online at https://www.newsweek.com/aliens-are-real-ufos-2019-sightings-americans-area-51-raid-extraterrestrial-disclosure-1458103.

Seth Shostak, PhD, is senior astronomer at the SETI Institute, Mountain View, California, and a CSI fellow. He is author of *Confessions of an Alien Hunter*.

ID Movement Still Stymied by Genetic Algorithms: War of the Weasels Update

DAVID E. THOMAS

I last wrote about the "War of the Weasels," the ongoing creationist attacks on evolutionary (genetic) algorithms, in the May/June 2010 issue of Skeptical Inquirer (Thomas 2010). Genetic algorithms (GAs) are computerized simulations of evolution and are used to study evolutionary processes and also to solve difficult engineering or math problems. Intelligent design (ID) creationists often criticize these algorithms for not generating true novelty, and they routinely claim that the "answer" is surreptitiously introduced into the program via the algorithm's fitness testing functions or via "active information" surreptitiously added by the programmer. The example creationists always cite to prove that GAs must be spoon-fed their solutions is Richard Dawkins's "Weasel" simulation described in *The Blind Watchmaker* (1986). This algorithm, used to show the power of cumulative selection, *does* include a precise description of its intended "target," the phrase "Methinks it is like a weasel" (from *Hamlet*), which is used all through the execution of the procedure. However, Dawkins himself stated in his exposition that evolution itself does *not* have a goal or a target—unlike his "Weasel."

In 2001, I set about to challenge this strawman argument by developing a genetic algorithm that solved problems without *any* knowledge of the answers in advance. I chose "Steiner's Problem": given a two-dimensional set of points, what is the most compact network of straight-line segments that connects the points? (Additional "Steiner Points" besides the fixed points are allowed.) I presented this work at a lecture following a talk by intelligent design founder Phillip Johnson at the University of New Mexico and continued working on this problem thereafter.

In the summer of 2006, I posted several articles on this topic on the *Panda's Thumb* blog (e.g., Thomas 2006a). The series of posts culminated in a public "Design Challenge" (Thomas 2006b), in which readers were given a week to submit answers for a tricky six-point Steiner system. Because the ID crowd was saying the solutions were known beforehand, I posted all my source code and challenged them to find the actual Steiner solution for the six-point problem; it was an open-book test. Ironically, the ID "theorist" who was complaining the loudest, Salvador Cordova, was unable to derive the actual answer to the problem, even after many days of effort. The actual answers (two were possible) were found by my genetic algorithm in a few out of hundreds of runs and also by dozens of independent fans of math and evolution. I was very surprised by the answers; I had expected a simpler solution, but this turned out to be inefficient. That's why I chose this particular problem for the public "Design Challenge" in the first place: I didn't know the actual answer, and therefore could

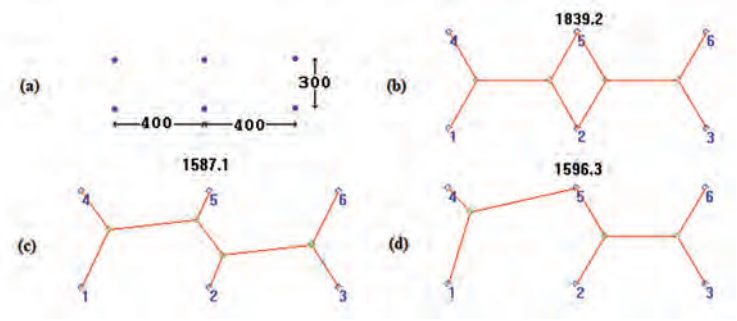


Figure 1: (a) The design challenge as posted on *Panda's Thumb*; (b) the "Double Bowtie," the shape the author expected as the solution to the challenge; (c) the actual best (Steiner) solution, with a slightly twisted, but more minimal, arrangement of segments; and (d) a second-best "quasi" solution, which was the best that could be attained by ID theorists after weeks of effort. Because the actual Steiner shape was unknown to the programmer, there was no way the solution could have been added via "active information."

not possibly have "smuggled it in" (see Figure 1).

So, after all these years, how has the ID community responded? They have by and large ignored the point of the Steiner Challenge, which was simply that most genetic algorithms (Dawkins's "Weasel" excluded) do *not* require the explicit answers it is hoped the algorithm will provide.

The Steiner networks are not simple and *are* clearly irreducibly complex: remove or alter *any* segment and the network is no longer connected.

The mathematical stalwarts of the ID movement—William Dembski, Robert Marks, and Winston Ewert (the latter two both still at Baylor, unlike Dembski, who was let go)—have since responded to my article on the Steiner GA. Amazingly, they are all *still* painting all genetic algorithms with the "Weasel" brush, but any relevance to Dawkins or evolution science is becoming harder and harder to perceive.

The gist of the Dembski, Marks, and Ewert response to the Steiner GA (Ewert et. al. 2012) is that "active information" is being supplied by the programmer to derive the answer: "The Darwinist claim is that no such assistance is required. Rather, natural selection is innately capable of solving any biological problem that it faces." But that is clearly a strawman argument: Have the stalwarts of ID never heard of … *extinction*?

In another paper published in 2014 in *BIO-Complexity* (Ewert 2014), Ewert attacks several GAs, including my Steiner algorithm. Ewert makes two huge errors in this part of his paper. He declares that the Steiner solutions are not irreducibly complex because a *different* method of connecting points, the much *simpler* Minimum Spanning Tree (MST) algorithm, can easily connect the dots. He writes, "A connected network can be achieved by random chance alone. The difficulty in the Steiner tree problem is in trying to minimize the amount of road used, not in getting a connected network." But the Steiner networks are not simple and *are* clearly irreducibly complex: remove or alter *any* segment and the network is no longer connected, as shown in Figure 2.

The second gaffe is the use of the ID concept of "complex specified information" (CSI). While the CSI concept is usually presented as "obvious" (the solutions must be both complex and specified), the mathematical definition of CSI has been carefully crafted to make the success of either evolution or GAs absolutely *impossible*. Dembski et al. have defined CSI as the property of having "500 bits of complexity." If the genetic algorithm under consideration *always* gets the answer to the posed problem, it thus has *zero* CSI (Dembski 2002). Even Dawkins's "Methinks it is like a weasel" has obvious complexity, but Dembski scores it as *zero* CSI, because the Dawkins algorithm *always converges*. If, like my Steiner algorithm, the GA does get the correct answer, say, only once in about 200 trials, it has *less than eight bits of CSI* ($2^8 = 256$). Only if the genetic algorithm gets the solution *rarely* (literally, once in $2^{500} \sim 10^{150}$ trials), does it finally achieve the honor of possessing "500 bits of CSI." This is as rare as tossing a fair coin 500 times and getting heads every time. The game is rigged: Neither genetic algorithms nor evolution can *ever* create CSI! The creationist assault on GAs is interesting but falls far, far short of the mark. ■

References

Dawkins, Richard. 1986. *The Blind Watchmaker*. New York: W.W. Norton and Company.

Dembski, W. 2002. *No Free Lunch: Why Specified Complexity Cannot Be Purchased without Intelligence*. Lanham, MD: Rowman & Littlefield.

Ewert, W. 2014. Digital irreducible complexity: A survey of irreducible complexity in computer simulations. *BIO-Complexity* 1: 1–10. doi:10.5048/BIO-C.2014.1. Available online at https://bio-complexity.org/ojs/index.php/main/article/view/BIO-C.2014.1/BIO-C.2014.1.

Ewert, W., W. Dembski, and R.J. Marks II. 2012. Climbing the Steiner tree—sources of active information in a genetic algorithm for solving the Euclidean Steiner tree problem. *BIO-Complexity* 1: 1–14. doi:10.5048/BIO-C.2012.1. Available online at https://evoinfo.org/papers/steiner.pdf.

Thomas, David. 2006a. Target? TARGET? We don't need no stinkin' Target! *Panda's Thumb Blog* (July 5). Available online at https://pandasthumb.org/archives/2006/07/target-target-w-1.html.

———. 2006b. Design Challenge results: Evolution is smarter than you are. *Panda's Thumb Blog* (August 21). Available online at https://pandasthumb.org/archives/2006/08/design-challeng-1.html.

———. 2010. The war of the weasels: Or how an intelligent design theorist was bested in a public math competition by a genetic algorithm! Skeptical Inquirer 34(3) (May/June).

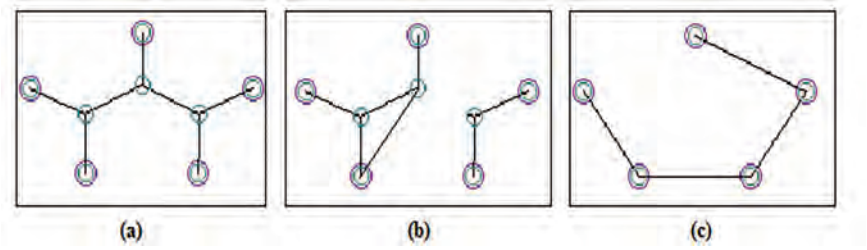


Figure 2. (a) This Steiner solution for five points is the actual Minimal Length Network. (b) This solution is irreducibly complex: if any segment is removed, or even re-routed, the connectivity becomes invalid; (c) A Minimum Spanning Tree for the same five points; while this connects the points, it clearly does not have the complexity of the actual shortest network.

David E. Thomas is a physicist and president of New Mexicans for Science and Reason. He is a fellow of the Committee for Skeptical Inquiry.

LEAVE *a* LEGACY *of* REASON

Imagine a future where science and reason serve as the foundation for our lives.

A future where free expression is guaranteed everywhere around the world.

A future where old sectarian divisions have been overcome by the common bond of secular ideals.

This is the future CFI is working toward. Together, we can achieve it. It's never too early to consider a planned gift—*a legacy of reason*.

Call today to reserve your copy of our new gift-planning brochure—a helpful guide through the many options available to you.

Then speak to your trusted financial advisor or attorney. It's as simple as that.

IT'S EASY

call **1-800-818-7071 x426**
for your copy of this valuable information,
or email **Connie Skingel at cskingel@centerforinquiry.org**
There's no obligation.

SECULAR FUTURE SOCIETY · A LEGACY OF REASON

Joe Nickell, PhD, is a former magician, private detective, journalist, and scholar. Since 1995, he has been CSI's senior research fellow, examining fringe-science claims.

Secrets of Beijing's Forbidden City

China's Forbidden City is a 178-acre ancient palace complex in the heart of Beijing. Constructed in the early fifteenth century, it is not only a national treasure but also a UNESCO World Heritage site (since 1987)—fittingly so, because it is the largest such palace site in the world. Double walled and ringed with a wide moat, it was off limits to the uninvited for 500 years under penalty of death—hence its designation as "forbidden." Now prosaically called the Palace Museum, it welcomes tourists who make it the world's most visited museum. I spent a wonderful day there in mid-October 2010, when I was the Center for Inquiry's visiting scholar in China, and began to study some of the labyrinthine palace's ancient secrets.

Construction Enigma

The Forbidden City served as regal home to two dynasties of imperial rulers—fourteen Ming emperors followed by ten of the Qing dynasty—from 1420 until 1912, the last Chinese emperor abdicating when the new government of the Republic of China took power (Mooney 2008, 66, 72).

Palace construction lasted from 1406 to 1420. It involved an estimated one million workers and was designed according to the ancient principles of *feng shui* (Bartlett 2014, 48–49). This held that everything was connected by the flow of a universal energy called *chi* and that the energy could be balanced to create harmony. Although feng shui lacks any scientific basis, a *perception* of harmony may be induced by using such aesthetic principles as bilateral symmetry. For example, in the Forbidden City features are arranged on either side of a north-south axis. That in turn was linked by astrologers to the North Star so that, when the emperor ascended his throne—there was one in each of three ceremonial halls—he was regarded as being at the epicenter of cosmic power.

Although feng shui lacks any scientific basis, a perception of harmony may be induced by using such aesthetic principles as bilateral symmetry.

Great stone ramps leading up to the ceremonial halls are evidence of a more mundane but ingenious power, as we shall see. The largest, at the north, was discovered in modern times to be composed of two slabs, the joint cleverly concealed by overlapping dragon carvings. But the southern ramp is a single piece, 54.4 feet long and weighing over 300 tons (272 metric tons)—even more

before being carved. It is the largest such stone carving in China (Vergano 2013; "Forbidden City" 2016).

The secret of how such massive stones were transported has long evaded solution. However, an explanation—once provided by folklore but dismissed by scholarly books—has now been confirmed by an international engineering team. Whereas textbook authors had stressed the availability at that time of the spoked wheel, which supposedly enabled wagons to do the heavy carrying, wagons could not have hauled anything so heavy, and other methods caused too much friction.

The engineers (including two from universities in Beijing and another from Princeton) searched archival documents and found ancient references to the use of sledges. One 500-year-old record specifically told of a 123-ton stone having been transported from a quarry to the Forbidden City, a forty-three-mile, twenty-eight-day trip, by an *ice sledge*. The team concluded that a wintertime "artificial ice path"—lubricated by water from wells along the route (as reported in the old documents)—was used, the stones being pulled by teams with as few as forty-six men. The investigators noted that wet ice would have only one-seventh the friction of bare ice (Vergano 2013).

Portrait of Kublai Khan drawn shortly after his death on February 18, 1294.

The secret of how such massive stones were transported has long evaded solution. However, an explanation has now been confirmed by an international engineering team.

Kublai Khan's Lost Palace

The name of Kublai Khan (1215–1294) is best known to the students of English literature from a poem by Samuel Taylor Coleridge,[1] romanticizing Khan's legendarily beautiful palace, Xanadu, described by explorer Marco Polo. Khan, a grandson of Genghis Khan, was the famed ruler of the Mongol Empire (from 1260 until his death in 1294) and, by conquest, founder in China of the Yuan dynasty, ruling as its first emperor (1271–1294).

Xanadu (or Shangdu) was the capital of Khan's Yuan dynasty until he moved it to the Jin dynasty capital at what is present-day Beijing. Afterward, Xanadu became his summer palace, the remains of which, north of the Great Wall, exist today as a UNESCO World Heritage Site. But where was Kublai Khan's newer palace at Beijing—a site long lost to history?

In November 2016, archaeologists discovered what they dared to suggest might be Khan's famously lost imperial palace. They were excavating in what should seem, in retrospect, a very promising place: Beijing's Forbidden City. The Yuan imperial palace was always thought to have been built somewhere near the present Forbidden City, but the archeologists who work for that complex now believe it had been under their very feet all the time ("Chinese archaeologists" 2016).

Specifically, the archeologists found a "3 meter [9.84 ft.] thick rammed earth and rubble foundation buried beneath the layers of Ming and Qing dynasty construction," according to the *South China Morning Post* (McDermott 2016). The foundation's size seemed unusual for an ordinary building of the Yuan dynasty, but it was credible as the site for a palatial hall.

The deputy director of The Institute of Archaeology at the Forbidden City, Wang Guangyao, told the *Post* that the newly discovered foundation is similar to another: that at Zhongdu, "one of the four capitals of the Yuan dynasty." He noted that some of the debris in the foundation dates back to still earlier dynasties, such as the Liao (907–1125) and Jin (1115–1234). What this could mean

(I find it exciting to consider) is that Kublai Khan may have superimposed his palace on an earlier palatial site (or sites) and that, in turn, the Ming dynasty utilized Khan's old site for the Forbidden City. This makes sense in terms of tradition and, in Khan's case, conquest.

In any event, Wang urges caution regarding the discovery: "Even if we think a certain site is important for an archaeological finding," he told the *Post*, "We can't just dig the ground up because it is not allowed. All we can do is wait and collect as much evidence as we can until sometime later, probably in a generation or two, work is done in those places and we can put all the finds together to see if all are connected" (McDermott 2016). Meanwhile, the Forbidden City plans to ready the archaeological site so that visitors may actually view the new discovery.

In November 2016, archaeologists discovered what they dared to suggest might be Khan's famously lost imperial palace.

Otherworldly Secrets

Ghosts are believed in around the world. During years of travel, I have investigated the phenomena of ghosts and hauntings across the United States as well as Canada, Europe, Mexico, Argentina, Australia, Morocco, Russia, China, and elsewhere. There are cultural differences, to be sure, a fact that perhaps nowhere is more apparent than in China.

Ghosts take many forms in Chinese culture, from malevolent entities to revered ancestral spirits. Notable among the latter are certain practices dedicated to the memory and respect of one's deceased loved ones. For example (comparable to Mexico's Day of the Dead), there is a special day in early April celebrated by "the Tomb-Sweeping Festival." During this time, families ritually cleanse ancestral gravesites and provide offerings to their spirits. These include not only flowers, food, and wine but even "ghost money"—paper currency burned as an offering and intended for use by the spirits (Nickell 2012, 178–179).

In the Forbidden City, the Hall of Ancestor Worship formerly housed the "spirit tables" of the dead emperors and empresses (Mooney 2008, 75). Upon them were placed small shrines or niches containing the all-important "spirit tablets," also known as ancestral or memorial tablets, which are made of wood and bear the name of the deity or past ancestor. Placed before the tablets were offerings, often on a separate lower table for the purpose. Such ritual displays are seen in temples, shrines, and home altars across China. Unfortunately, all the shrines and statues in the Hall of Ancestral Worship were destroyed during the Cultural Revolution, although Premier Zhou Enlai intervened to save the Forbidden City itself from destruction.

While the soul is held to reside in the tablet, it does not mean that it is confined to it. In fact, a common belief is that a person has three souls: Besides the one that takes residence in its tablet is another that yet remains in the grave, and yet another goes to an otherworldly domain (Addison 1925).

In addition to ancestral spirits, there were also folkloric ghosts and evil spirits. To ward off the latter, large mirrors were placed beside the emperor's throne in the Forbidden City ("Visit" 2016). Also believed to be powerfully protective were guardian lion sculptures—usually in pairs, male and female—that typically stood watch at temples and imperial buildings in China, as in the Forbidden City, dating from both the Ming and Qing dynasties. Another protective element against ghosts is said to be the ubiquitous bottom doorsill (or threshold step) in doorways, supposed to keep out shuffling ghosts. Actually, the custom was more likely to exist for its practical functions (to keep out wind, rain, small animals, etc.) and cultural purposes (for example, as a symbol of boundary and status) ("The culture" 2017).

As this brief sketch shows, in China as elsewhere ghost beliefs and practices have their own cultural expression, but everywhere they appear to be prompted by the same hopes and fears that motivate people universally.

* * *

I find we have much to learn from the ancients as we study their remarkable achievements—those of the Forbidden City among them—and try to understand their thinking. Ultimately, we may learn not only their secrets but more about ourselves as well. ■

Note

1. Coleridge's famous poem uses for its title the earlier English spelling of Khan's name: "Kubla Khan; or, A Vision in a Dream: A Fragment." It was written in 1797 following a dream induced by a prescribed anodyne (probably opium), after he had read a work describing Xanadu. The poem—an example of Romanticism in English verse—was published in 1816 at the urging of Lord Byron.

References

Addison, James Thayer. 1925. Chinese Ancestor Worship. Available online at http://anglicanhistory.org/asia/china/addison_ancestor1925/02.htlm; accessed December 20, 2016.

Bartlett, Sarah. 2014. *Guide to the World's Supernatural Places*. Washington, DC: National Geographic.

Chinese archaeologists solve mystery of Beijing's Forbidden Palace. 2016. *South China Morning Post*, International Edition. Available online at http://www.scmp.com/news/china/society/article/1941678/chinese-archaeolgists-solve-msytery-beijings-forbidden-palace; accessed December 28, 2016.

The Culture of Chinese Doorsill. 2017. Available online at http://China-talk-blogspot.com/2015/01/the-culture-of-chinese-doorsill.html; accessed January 3, 2017.

Forbidden City. 2016. Available online at https:/en.wikipedia.org/wiki/Forbidden_City; accessed December 19, 2016.

McDermott, Alicia. 2016. Chinese archaeologists may have solved the mystery of the lost palace of Kublai Khan. *Ancient Origins*. Available online at https://www.ancient-origins.net/news-history-archaeology/chinese-archaeologists-may-have-solved-mystery-lost-palace-kublai-khan-020861; accessed December 28, 2016.

Mooney, Paul. 2008. *National Geographic Traveler: Beijing*. Washington, DC: National Geographic.

Nickell, Joe. 2012. *The Science of Ghosts*. Amherst, NY: Prometheus Books.

Vergano, Dan. 2013. Beijing's Forbidden City built on ice roads. Available online at http://news.nationalgeographic./com/news/2013/10/131104-china-ice-road-forbidden-city-culture-science/; accessed December 29, 2016.

Visit Our China: Forbidden City. 2016. Available online at http://visitourchina.com/beijing/attraction/forbidden-city.html; accessed December 30, 2016.

[REALITY IS THE BEST MEDICINE HARRIET HALL

Harriet Hall, MD, also known as "The SkepDoc," is a retired family physician, a CSI fellow, and an editor of the *Science-Based Medicine* blog. Her website is www.skepdoc.info.

Applied Kinesiology and Other Chiropractic Delusions

Kinesiology is the scientific study of movement. Applied kinesiology is a bogus muscle-testing technique most commonly used by chiropractors but also by some other health care practitioners. It is neither scientific nor valid but instead based on a delusion. One commenter said, "It is denounced as an absurd and dishonest parlour trick by anyone else who knows anything about it."[1]

Applied kinesiology was originated by a chiropractor, George J. Goodheart, in 1964. He claimed that applied kinesiology muscle testing could be used to evaluate[2] nerve, vascular, and lymphatic systems; the body's nutritional state; the flow of "energy" along "acupuncture meridians"; and "cerebro spinal fluid function." There is no evidence for any of this.

Weaker muscle responses supposedly indicate illness in a corresponding body organ, an allergy, or a nutritional deficiency. Numerous double-blind studies have evaluated the accuracy of applied kinesiology and found it to be no better than chance.

Applied kinesiology is neither scientific nor valid but instead based on a delusion.

A 2013 double-blinded randomized study[3] assessed the validity of applied kinesiology by comparing the muscle strength of fifty-one subjects when holding test tubes containing saline to muscle strength when holding a solution of a toxin. Muscle strength was determined by subjective manual testing by two different applied kinesiology practitioners and by the objective measurements of a dynamometer. It found that the results reported by the applied kinesiology practitioners were no better than chance and neither were the results of the dynamometer. It concluded that applied kinesiology testing was unre-

liable and not replicable by different examiners, and there was no evidence that it worked any better than chance. They found that belief in applied kinesiology did not influence results. They also reviewed the published literature and commented:

> The research published by the Applied Kinesiology field itself is not to be relied upon, and in the experimental studies that do meet accepted standards of science, Applied Kinesiology has not demonstrated that it is a useful or reliable diagnostic tool upon which health decisions can be based.

In describing how he became a chiropractor, he mentioned that he had never been very good at science in school; that was the one thing in his lecture that I could believe.

Even integrative medicine guru Dr. Weil disapproves. His website[4] says, "Dr. Weil believes that not even the best of applied kinesiology tests and diagnostic procedures has stood up to studies comparing them with standard medical techniques, and is unaware of any sound scientific evidence to support the claims made by AK practitioners."

Many practitioners claim that applied kinesiology can be used to diagnose allergies. I once attended a lecture by a chiropractor who swore by it. He would have patients hold a sealed glass vial containing an allergen and would compare the muscle resistance in their arms when holding and not holding the vial. He found all manner of "allergies." He described one patient he thought must be allergic to something in the workplace at Boeing. He said, "I didn't have a vial of Boeing, but I had him think about Boeing and that worked just as well." He described all kinds of success stories with food allergies. He would have the patient avoid the offending food for a time; their symptoms would improve, and then they could start eating that food again. In describing how he became a chiropractor, he mentioned that he had never been very good at science in school; that was the one thing in his lecture that I could believe.

Nambudripad's Allergy Elimination Techniques (NAET)

The chiropractor I saw lecture was practicing Nambudripad's Allergy Elimination Techniques (NAET). Dr. Nambudripad was a student chiropractor and acupuncturist when she developed NAET. She blamed ADHD, ADD, autism, and migraine headaches on allergies and explained that allergies are caused by "repulsive electromagnetic fields between an individual and the object (allergen)." She claimed 95 percent of human ailments are caused by allergies to substances, emotions, or even colors. She claimed she could remove these blockages with acupressure or acupuncture. Her claims are pseudoscientific and have been debunked on Quackwatch[5] and by numerous professional allergy associations.

Acceptance by Chiropractors

Despite the lack of evidence, applied kinesiology is widely accepted by chiropractors and some other practitioners. A 2003 survey by the National Board of Chiropractic Examiners showed that applied kinesiology was the tenth most common chiropractic technique, used by 37.6 percent of chiropractors. In a subsequent survey in 2009, they didn't even ask about the use of applied kinesiology or any of the subluxation-based "adjustive procedures" that might place chiropractic in an unfavorable light. There are no up-to-date statistics, but it is common knowledge that quite a few chiropractors still use applied kinesiology.

One of my favorite skeptical stories involves applied kinesiology. You can read about it in Ray Hyman's article on ideomotor action[6] on the Quackwatch website. A group of chiropractors agreed to a test in Dr. Wallace Sampson's medical office. First, they demonstrated that they could distinguish between "good" sugar (glucose) and "bad" sugar (fructose) by putting a drop of sugar solution on the subject's tongue and pushing their upraised arm down to a horizontal position. The chiropractors were able to reliably tell whether it was glucose or fructose based on how strongly the subject could resist the chiropractor's pressure on their arm. Then they were re-tested under strict double-blind procedures with coded test tubes; no one in the room knew which sugar was in which test tube. Under those conditions, the chiropractors failed miserably; they couldn't tell the sugars apart. But they still thought they could, never mind evidence and reality. The head chiropractor told Hyman, "You see, that is why we never do double-blind testing anymore. It never works!" At first Hyman thought he was joking—but he wasn't. The chiropractor was absolutely convinced that applied kinesiology was valid. If the test indicated otherwise, that could only mean that the scientific method was somehow defective. Belief can be stronger than reality.

Delusions Based on the Ideomotor Effect

In that same Quackwatch article, Ray Hyman explains how the ideomotor effect can fool chiropractors and scientists. Expectations translate into almost undetectable motor movements. Because the operator is not consciously aware that he moved, he attributes the movement to an external force, often one unknown to science. This can translate to delusions of grandeur or persecution. Psychological forces come into play, allowing proponents to protect their beliefs by distorting, forgetting, or ignoring evidence.

Applied kinesiology practitioners think they are applying the same amount of force every time. But their belief systems fool them into subconsciously using less or more force. The patients believe they are consistently using the same amount of resistance, but if they know what to expect, they can subconsciously adjust their resis-

tance. And there are parlor tricks that practitioners may use consciously or unconsciously—pressing down on slightly different sites on the arm or applying pressure at a slightly different angle. As Ray Hyman put it, "Knowing an allegedly harmful substance has been applied, the practitioner unconsciously presses a little harder and the patient unconsciously resists a bit less."

It gets sillier and sillier. There is a picture on the internet where a chiropractor is evaluating a child by testing the mother's arm strength with the mother lying down while the child sits on her. And I heard about a layman who claimed to use applied kinesiology to test people *over the telephone* and advise them about what supplements they should take. Richard Feynman reminded us that the first principle of science is not to fool yourself—and you are the easiest person to fool. The only reliable way to keep from fooling ourselves is to rely on proper scientific testing with a control group.

The International College of Applied Kinesiology-USA

Applied kinesiology even has its own professional organization, the International College of Applied Kinesiology-USA (ICAK-USA). When Stephen Barrett called applied kinesiology "phony" on Quackwatch,[7] they protested and asked him to publish their rebuttal letter, which he did.[8] It is far from convincing. It essentially says that applied kinesiology was never intended to be used alone, and the negative studies were from people who weren't doing true applied kinesiology (this is the "No True Scotsman" logical fallacy). They claimed to have research on their website showing that applied kinesiology was effective when properly used, but the page listing those studies no longer exists (if it ever did).

The history of chiropractic is riddled with delusions. Its founder, D.D. Palmer, erroneously thought he could detect bones out of place in the spine and put them back, and he thought he had cured a deaf man by manipulating his back (although the man's daughter later claimed he remained deaf until the day he died). Palmer's son B.J. imagined that he could feel the course of nerves under the skin with his fingers; his "nerve tracing" technique was taught for years before being discarded.

True medical subluxations are partial dislocations of a joint that can be seen on X-rays; the chiropractic subluxation is a myth. To this day, many chiropractors have continued to diagnose "chiropractic subluxations." They are inconsistent: different chiropractors disagree about which vertebra is subluxed. Once X-ray evidence had demonstrated the reality that there are not actually any bones out of place, chiropractors revised the definition of *chiropractic subluxation*, calling it "a complex of functional and/or structural and/or pathological articular changes that compromise neural integrity and may influence organ system and general health." In my opinion, that is so vague it amounts to an excuse for chiropractors to adjust the spines of anyone they want to treat.

The chiropractor was absolutely convinced that applied kinesiology was valid. If the test indicated otherwise, that could only mean that the scientific method was somehow defective.

Some chiropractors today reject the subluxation concept. In 2009, chiropractors reviewed the literature and published an article in the journal *Chiropractic and Osteopathy*.[9] They found no evidence that the chiropractic subluxation was associated with any disease process or that it created any suboptimal health conditions. They concluded, "the subluxation construct has no valid clinical applicability."

In 2010, the General Chiropractic Council of the U.K. offered this guidance to chiropractors: "The chiropractic vertebral subluxation complex is an historical concept but it remains a theoretical model. It is not supported by any clinical research evidence that would allow claims to be made that it is the cause of disease or health concerns."

Some chiropractors continue to practice upper cervical chiropractic in the belief that adjusting the top cervical vertebra will correct subluxations throughout the spine. A clearly delusional chiropractor was a woman who thought she was practicing upper cervical chiropractic but was not actually touching the patient. When confronted with a video of her performance, she said, "My whole thing is that I'm touching."[10] I still don't know whether to laugh or cry.

The National Board of Chiropractic Examiner study mentioned above also showed that 41 percent of chiropractors used acupressure or meridian therapy, 39 percent used homeopathy, and 13 percent used acupuncture with needles. It revealed that many chiropractors treat conditions they have no business treating, such as diabetes, cancer, heart attacks, and infantile colic.[11]

Applied kinesiology is bogus, but it serves to illustrate the fallibility of human beliefs and the need for controlled scientific studies. ■

Notes

1. https://www.painscience.com/articles/applied-kinesiology.php
2. https://www.quackwatch.org/01QuackeryRelatedTopics/Tests/ak.html
3. https://www.ncbi.nlm.nih.gov/pubmed/24607076
4. https://www.drweil.com/health-wellness/balanced-living/wellness-therapies/applied-kinesiology/
5. https://www.chirobase.org/06DD/naet.html
6. https://www.quackwatch.org/01QuackeryRelatedTopics/ideomotor.html
7. https://www.quackwatch.org/01QuackeryRelatedTopics/Tests/ak.html
8. https://www.quackwatch.org/01QuackeryRelatedTopics/Tests/icakletter.html
9. https://chiromt.biomedcentral.com/track/pdf/10.1186/1746-1340-17-13
10. https://sciencebasedmedicine.org/no-touch-chiropractic/
11. https://chiro.org/LINKS/FULL/Practice_Analysis_of_Chiropractic_2015/Practice_Analysis_of_Chiropractic_Home_Page.html

Matthew C. Nisbet is professor of communication, public policy and urban affairs at Northeastern University and is a monthly columnist at *Issues in Science and Technology* magazine.

Tony Robbins Next Door

Personal Coaches Are the New High Priests of Self-Help

In a new column focused on "The Examined Life," Matthew Nisbet investigates the twisted messages about human happiness and flourishing that dominate popular culture, offering readers a skeptical dose of anti-self-help advice.

A few years ago, I moved with my wife and son to an upper-middle-class community north of Boston. As I walked around town, I soon encountered advertising for a local cottage industry of personal coaches and lifestyle consultants. Papered on the walls of food stores, coffee shops, and fitness studios were posters for career coaches, parenting coaches, wellness coaches, and leadership coaches. There was even a local spoon bender who offered spiritual coaching. Alongside the adverts for coaches were also pitches by consultants offering to organize a child's birthday party, prepare organic and gluten-free meals, declutter a home, and advise on family trips to Disney World.

In today's culture of non-stop striving, the personal coach and lifestyle consultant have become the high priests of our age, preaching a quasi-religious obsession with the development of the self, writes the psychologist and philosopher Svend Brinkmann (2017). There are about 20,000 life coaches and consultants working in North America today, earning a median $61,000 a year, about twice that of the average U.S. worker (Green 2017).

But as these coaches sell us on achieving self-optimization, their professional advice and services come with several trade-offs that are ultimately not worth the price, Brinkmann and other scholars warn. To avoid the perpetual trap of constant self-improvement and depersonalization that the life coaching industry preaches, we should instead fire our coaches and spend more time building stronger relationships with friends and family, they argue.

Papered on the walls of food stores and coffee shops were posters for all kinds of life coaches. There was even a local spoon bender who offered spiritual coaching.

Optimizing the Self

Life coaching is the latest evolution of the 1960s positive psychology and human potential movements, which traded the external authority of God for the inner authority of the psyche. Only by discovering the authentic self, or "ego," could happiness be achieved, details the journalist Will Storr (2017). Encouraged by counterculture authors and celebrities, millions of baby boomers had turned to psychoanalysis, meditation, yoga, and hallucinogenic drugs by the end of the 1970s. Tens of thousands had also set off on voyages of self-discovery to California's Esalen and similar retreat centers, participating in ritualized encounter group sessions that promised to strip away the layers of the false self so that they could finally live an authentic life.

Yet in contrast to the New Age self-help movement where leaders promised liberation from what they deemed to be a suffocating, capitalism-driven conformity, today's life coaches sell themselves as relentlessly practical and results oriented, enabling clients to outperform at work and home. Life coaches frequently draw on the example of elite athletes, encouraging clients to achieve the same levels of self-discipline and competitiveness. In contrast to the 1960s, the quest today is not to discover the true self but instead the optimized self. The mantra has shifted from "turn on, tune in, and

drop out" to "achieve peak performance."

"To become yourself, you have to become better—and to become better, you have to reach your goals," is how the sociologists Carl Cederström and André Spicer (2015) sum up today's self-improvement craze. "Self exploration and self-discovery [are] morphed into self-actualization and self-enhancement."

There are no state licensees required to be a personal coach, and certification training can vary from a few hours of online courses to hundreds of hours of classes, depending on the marketed program. Life coaches usually work with clients on a weekly basis, meeting with them either in person or via video chat, with the cost of a typical meeting ranging from $50 to $200 per hour. Though coaching techniques vary, almost all involve an emphasis on goal setting, guiding the client in discovering an authentic "vision" for their professional and personal lives, and then constructing a plan for achieving that vision (Pagis 2016).

Personal coaches tell clients that if they are to achieve their visions, they must take responsibility for their own life and sense of well-being. This is sound advice in most cases. But the "flip side is that we have no one to blame but ourselves for all conceivable problems, whether they are about relationship breakdowns, job losses, or serious illnesses," write Cederström and Spicer (2015). "The coach no longer defers the client's anxiety but pushes the tyranny of choice [and responsibility] back onto the client."

The implicit message promoted by the life coaching industry, notes Brinkmann (2017), is that the perpetual pursuit of self-improvement defines the meaning of our existence, regardless of the actions we take or the directions we pursue. Yet if taken to the extreme, "this way of thinking resembles psychopathy or antisocial personality disorder," he writes. "Other people are, at best, instruments at your service, used to maximize our happiness and success." As an example, he cites the advice emphasized by Tony Robbins, the world's most famous life coach. Since the 1990s, Robbins has been a consultant to world leaders and mega-celebrities, sold millions of books, and packed sporting arenas for his talks. Robbins preaches a mantra of "Never Ending Improvement" in every aspect of life, which is achievable only by adopting a "growth mindset" and by constantly monitoring results. As he often tells audiences: "Success is doing what you want to do, when you want, where you want, with whom you want, as much as you want."

Outsourcing the Self

By hiring a life coach or personal consultant, not only do we risk falling victim to our own grandiosity and self-centeredness, but we outsource many of the most intimate aspects of our lives that we previously performed ourselves, setting in motion a self-perpetuating trap. "The more anxious, isolated and time-deprived we are, the more likely we are to turn to paid personal services," writes sociologist Arlie Russell Hochschild (2012). "To finance these extra services, we work longer hours. This leaves less time to spend with family, friends and neighbors; we become less likely to call on them for help, and they on us."

From this perspective, working with a life coach risks trading invaluable emotional attachments for instrumental rewards. When dating coaches, for example, advise us to focus on return-on-investment, it is the first step toward defining love and marriage not in terms of responsibility and duty but in terms of "what is good for me." If we hire a consultant to organize our child's birthday party or plan a family vacation, we immediately start to think about these experiences in terms of efficiency and optimization—the language of commerce and the marketplace rather than of human relationships. In each of these cases, we "detach ourselves from the small—potentially meaningful—aspects of experience," argues Hochschild. "Confining our sense of achievement to results, to the moment of purchase, so to speak, we unwittingly lose the pleasure of accomplishment, the joy of connecting to others and possibly, in the process, our faith in ourselves" (Hochschild 2012).

Duty before Self

The confidence and trust that we place in our personal coaches, warns Brinkmann, has replaced traditional friendships and extended family ties. The types of intimacies that in the past we would have shared only with close friends or family are now shared with coaches. When we turn to a coach for parenting or marriage advice, we are asking a paid stranger for answers to the most central life questions.

As Aristotle advised, true friendship has its own intrinsic value. Close friends or family members—such as your own child—are people you help for their own sake. You have a duty to be there for them regardless of whether you believe you are getting something out of it or not. Helping someone else because it benefits you is not a friendship but a partnership based on a contract. A life coach, therefore, is the very epitome of an instrumental relationship, argues Brinkmann (2017).

The profusion of life coaches is part of a broader trend within our accelerated culture in which we are more likely to refer to "network building" than friendship building. The "social capital" that such a network might provide, enabling a mother, for example, to post to Facebook seeking advice on a birthday party organizer or a Disney World trip consultant, symbolizes the pervasive monetization of personal relationships.

To avoid the perpetual trap of constant self-improvement that the personal coaching industry preaches, Brinkmann urges us to fire our coaches and instead invest in building closer friendships and relationships. Not only will such friendships provide the support that we otherwise outsource to life coaches, our friendships will also help us shift from focusing on our inner impulses to what truly should define our lives, fulfilling our duties and responsibilities to others. ■

References

Brinkmann, S. 2017. *Stand Firm: Resisting the Self-Improvement Craze*. New York: John Wiley & Sons.

Cederström, C., and A. Spicer. 2015. *The Wellness Syndrome*. New York: John Wiley & Sons.

Green, K. 2017. You're a what? Life coach. U.S. Bureau of Labor Statistics (January). Available online at https://www.bls.gov/careeroutlook/2017/youre-a-what/life-coach.htm.

Hochschild, A.R. 2012. The outsourced life. *The New York Times* (May 6): SR1.

Pagis, M. 2016. Fashioning futures: Life coaching and the Self-Made identity paradox. *Sociological Forum* 31(4): 1083–1103.

Storr, W. 2017. *Selfie: How the West Became Self-Obsessed*. New York: Pan Macmillan.

Stuart Vyse is a psychologist and author of *Believing in Magic: The Psychology of Superstition*, which won the William James Book Award of the American Psychological Association. He is a fellow of the Committee for Skeptical Inquiry.

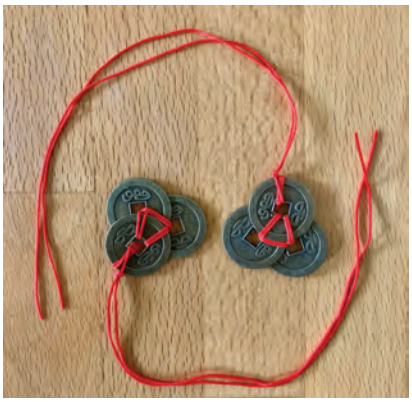
Superstition and Real Estate

Part 1: The Chinese Market

This is the first of a two-part series on the effect of superstitious belief on the real estate market. The second installment will appear in a future Behavior & Belief column.

I recently discovered a disturbing fact: my home office is in the northwest corner of my house, which is very bad. Furthermore, I often sit in my home office facing northwest, which is also very bad. So said Los Angeles feng shui expert Carol Assa in a *New York Times* article published last year (Eng 2019). Assa said I might be able to improve the feng shui of my home by placing six feng shui coins tied with red string in the southwest corner of my house. While writing this column, I did buy six feng shui coins tied with red string, but I have no intention of putting them in the southwest corner of my home. I just thought they looked pretty. However, despite all these foreboding signs, I can take comfort from the fact that feng shui is an ancient Chinese pseudoscience with no evidence to support it (Matthews 2018). Maybe I won't have to move my home office after all.

Feng shui is a belief system based on the concept of *chi* (or *qi*), the life force that is a foundational belief in Chinese traditional medicine and purported to be present in humans and all nature. Feng shui is a form of geomancy that, when applied to residential houses as well as to commercial and public buildings, suggests that the design of the building and its placement in the surrounding landscape will affect the fortunes and well-being of its inhabitants (Matthews 2018). In 1949, when Communists rose to power in mainland China, feng shui was labelled an unscientific, anti-Marxist superstition and outlawed. The crackdown intensified during the Cultural Revolution of 1966–1976. But feng shui remained popular in Hong Kong, Taiwan, and among Chinese populations outside of China. As the Chinese economy has opened up in recent decades, feng shui has regained popularity in the People's Republic of China, particularly among the wealthy (Coonan 2011). Today there are several different schools of feng shui, and feng shui advisors offer their services throughout Asia but also in Europe and the United States. In addition to making recommendations about the setting and landscaping of a home, many feng shui consultants advise home owners on interior design in an effort to harmonize dwellings with the local flow of *chi*.



Six Chinese feng shui coins tied in red string. (Source: author photo)

The remarkable rise of the Chinese economy has stimulated increased interest in consumer research on Chinese superstitions—particularly as they might be employed to increase profits. For example, red is a color associated with good luck in Chinese culture. Wedding dresses are often red, as are many other objects. Researchers Thomas Kramer and Lauren Block (2007) found that Chinese consumers would be more satisfied after the product failure of a rice cooker if it were a lucky red color than if it were a neutral green.

Interior of a Chinese restaurant featuring the lucky color red. (Source: eak_kkk on Pixabay.com)

Similarly, the number four is unlucky in Chinese culture because when spoken it sounds like the word *death*. Alternatively, the number eight is considered good luck because it sounds like the word for *wealth* or *prosper* (Vyse 2019). In another study, Kramer and Block (2007) found that Taiwanese consumers

were more likely to buy a portable radio when the price was higher but included lucky eights (TW$888) than when it was lower but made up of neutral numbers (TW$777). Similarly, consumers were more likely to buy a digital camera that had a higher price made up of neutral numbers (TW$6,555.55) than one priced lower but including unlucky numbers (TW$6,444.44). This research shows how belief in Chinese number superstitions is both irrational and potentially costly.

It is clear that retailers are conscious of the superstitious implications of their product pricing. One study recorded the prices of products advertised in several newspapers from Shanghai, Taiwan, and Hong Kong. Sampling a total of 499 items, the researchers found that advertised prices ended in eight significantly more than any other digit—on 39.9 percent of items. Prices ending in four were the least likely, occurring on 1.4 percent of items, a rate significantly lower than the 10 percent expected by chance (Simmons and Schindler 2003). Finally, a recent study of transactions on the Hong Kong Stock Exchange showed that traders were particularly attracted to stock trades with lot numbers ending in eight, despite the fact that lot numbers are assigned arbitrarily (Chen et al. 2019).

A brief aside about eight. The number eight is remarkably pervasive in Chinese society due to its association with good luck. The opening ceremonies of the Twenty-Ninth Summer Olympics in Beijing started at 8:08 p.m. on August (the eighth month) 8, 2008 (Kramer and Block 2007). Similarly, in 2003, Sichuan Airlines bought the phone number 8888-8888 (eight eights) at auction for the equivalent of $280,000 (Vyse 2019). They intended to use it as their customer service number.

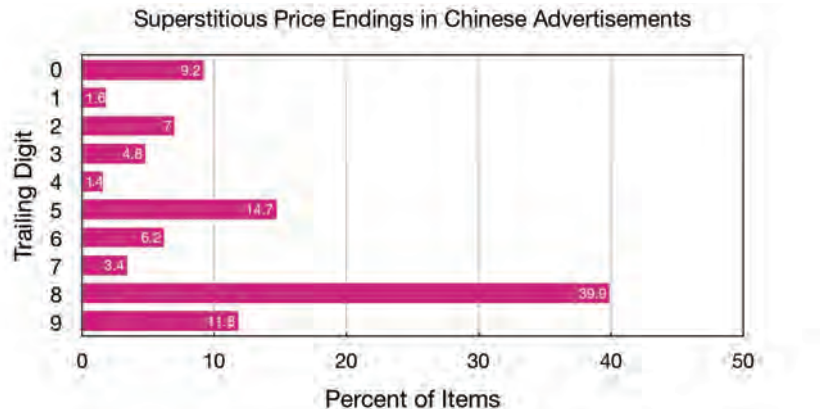
Feng Shui in the Real Estate Market

Buying a home is one of the most important financial decisions a person can make, and subscribing to Chinese superstitions can make it even more costly. Several studies have attempted to identify the variables that are important in the Chinese housing market. Hong Kong has been an excellent laboratory for this research for two reasons: (1) it is a hotbed of traditional Chinese superstitions; and (2) much of the housing is in high-rise apartments. This last point makes it easy to look at the effect of lucky and unlucky floors on the price of Hong Kong apartments. According to tradition, apartments on floors 4, 14, 24, 34, etc., would be considered bad luck, and apartments on floors 8, 18, 28, etc., would be good luck. It appears that floor number is an important variable in Hong Kong real estate, but the research findings have been somewhat inconsistent. For example, a study published in 2001 (Chau et al. 2001) showed that, in housing boom periods, home buyers were willing to pay 2.8 percent more for an apartment on a floor ending in eight. They found no effect of unlucky floor numbers. In contrast, a study published six years later found no effect of lucky floor numbers but significant negative effect on the price of floor numbers ending in four (Choy et al. 2007). Go figure.

A more recent study using houses, rather than apartments, appears to show a much clearer effect of lucky numbers in the real estate market for Chinese customers. The researchers used data on approximately 117,000 house transactions combined with census data for several neighborhoods in the Vancouver area, which is home to a large number of Chinese immigrants (Fortin et al. 2014). The researchers found that, even without controlling for the number of Chinese residents in the area, houses with addresses ending in four were 3.1 percent lower in price than average, and those ending in an eight were 3.4 percent more expensive. Furthermore, for each additional percentage of Chinese residents in a neighborhood, the superstitious effect of fours increased by 5.5 percent and of eights by 6.4 percent. In non-Chinese neighborhoods, there was no effect of either of these numbers on housing prices.

As the Chinese economy has opened up in recent decades, feng shui has regained popularity in the People's Republic of China.

A 2012 study conducted in Taiwan examined six features of a home that are thought to bring bad feng shui (Lin et al. 2012):



Percentage of prices ending in each of ten values for items advertised in Chinese newspapers. (Source: based on data from Simmons and Schindler 2003)

Bad Feng Shui Features

1. *Lu-chun*, which means the house is at the end of a street facing directly down the street.

2. The house is on a dead-end road. It is thought that because the street lacks a free flow, it may acquire stagnant chi.

3. Near a viaduct. A house near a viaduct will appear to be cut by the viaduct, making the people inside uncomfortable.

4. Near a cemetery or funeral parlor. The house may acquire *yin-chi*, a bad form of chi that accumulates around the dead.

5. Near a temple or shrine. Chinese people burn money printed on joss paper—a coarse paper typically made from bamboo—in the temple as an offering to ancestors. It is thought that this activity can pollute the nearby air.

6. On the fourth floor. Four is an unlucky number.

The researchers found that out of these six variables, five had statistically significant negative effects on home prices in Taiwan. The prices for homes with *lu-chun* were lower than those without *lu-chun*, but the effect was not significant. In addition, the researchers found that, in general, the effects of feng shui on real estate prices were larger on more expensive homes, a finding consistent with past results.

It is clear that feng shui is deeply imbedded in Chinese culture and has a powerful effect on Chinese customers in the real estate market. If you were a shrewd non-superstitious buyer, you could get a bargain on a forty-fourth floor apartment in Hong Kong, but if you are at all concerned about resale value, you might want to think twice. As the number of wealthy Chinese has grown, many are buying real estate in the United States, and as a result the principles of feng shui are playing a larger role in the market here. A 2015 *New York Times* article reported that when a Dallas real estate broker made videos of his properties to send to China, he brought a compass with him so that he could prove that a house had the north-south orientation required for good feng shui (Searcey and Bradsher 2015). Other real estate offices employ feng shui consultants to assist their customers.

For those who would like to see less superstition in the world, feng shui and other Chinese superstitions appear unlikely to disappear any time soon, because they so completely saturate the economic environment. In European culture, people fear black cats, the number thirteen, and walking under ladders, but Western traditional superstitions are rarely harnessed for financial gain. In contrast, the color red, lucky and unlucky numbers, and the principles of feng shui are everywhere in Chinese culture, and they have powerful financial implications. In the immortal words of Groucho Marx, "Love flies out the door when money comes innuendo." The same could be said for science and reason. Superstition is very difficult to combat when it is supported by the profit motive.

The researchers found that houses with addresses ending in four were 3.1 percent lower in price than average, and those ending in an eight were 3.4 percent more expensive.

As for my office in the northwest corner of my home, the recommendations Carol Assa, the Los Angeles feng shui expert, made were for 2019 (Eng 2019), which happened to be a remarkably good year for me and particularly good for the things I produced in my home office. Assa may have different recommendations for 2020, but I don't think I'll bother to consult her. ■

References

Chau, K.W., V.S.M. Ma, and D.C.W. Ho. 2001. The pricing of 'luckiness' in the apartment market. *Journal of Real Estate Literature* 9(1): 29–40.

Chen, Tao, Andreas Karathanasopoulos, Stanley Iat-Meng Ko, et al. 2019. Lucky lots and unlucky investors. *Review of Quantitative Finance and Accounting*. Available online at https://doi.org/10.1007/s11156-019-00805-8.

Choy, Lennon H.T., Stephen W.K. Mak, and Winky K.O. Ho. 2007. Modeling Hong Kong real estate prices. *Journal of Housing and the Built Environment* 22(4): 359–68. Available online at https://doi.org/10.1007/s10901-007-9.

Coonan, Clifford. 2011. The feng-shui revolution. *The Independent* (October 22). Available online at https://www.independent.co.uk/news/world/asia/the-feng-shui-revolution-769756.html.

Eng, Dinah. 2019. Seeking a harmonious life with feng shui. *The New York Times* (March 26). Available online at https://www.nytimes.com/2019/03/26/realestate/feng-shui-tips-harmonious-home.html.

Fortin, Nicole M., Andrew J. Hill, and Jeff Huang. 2014. Superstition in the housing market. *Economic Inquiry* 52(3): 974–93. Available online at https://doi.org/10.1111/ecin.12066.

Kramer, Thomas, and Lauren Block. 2007. Conscious and nonconscious components of superstitious beliefs in judgment and decision making. *Journal of Consumer Research* 34. Available online at https://doi.org/10.1086/523288.

Lin, Chu-Chia, Chien-Liang Chen, and Ya-Chien Twu. 2012. An estimation of the impact of feng-sui on housing prices in Taiwan: An application of quantile regression. *International Real Estate Review* 15(3): 325–46.

Matthews, Michael R. 2018. Feng shui: Educational responsibilities and opportunities. In *History, Philosophy and Science Teaching* edited by Michael Matthews. Cham, Switzerland: Springer, 3–41.

Searcey, Dionne, and Keith Bradsher. 2015. Chinese cash floods U.S. real estate market. *The New York Times* (November 28). Available online at https://www.nytimes.com/2015/11/29/business/international/chinese-cash-floods-us-real-estate-market.html.

Simmons, Lee C., and Robert M. Schindler. 2003. Cultural superstitions and the price endings used in Chinese advertising. *Journal of International Marketing* 11(2): 101–11. Available online at https://doi.org/10.1509/jimk.11.2.101.20161.

Vyse, Stuart. 2019. *Superstition: A Very Short Introduction*. Oxford: Oxford University Press.

[SKEPTICAL INQUIREE BENJAMIN RADFORD

Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or coauthor of a dozen books, including *Investigating Ghosts: The Scientific Search for Spirits*.

Investigating Mothman's Red Eyeshine

Q: In researching reports of Mothman, I've found many references to the beast having glowing red eyes. Is that real?

—O. Elfenkamper

A: Mothman is the name bestowed upon one or more mysterious flying creatures first reported in the small West Virginia town of Point Pleasant starting with several prominent sightings in November 1966 and trailing off the following year. The animal was described variously (and ambiguously) as humanoid and avian, often with red glowing eyes and giant wings. The first reports occurred in a heavily wooded area known locally as the "TNT area," used during World War II for munitions production.

The Mothman story—full of folklore, UFO-related embellishments (mostly by writer John Keel), crypto-tourism, curses, and more—is both fascinating and extensive. Here I focus on one of the monster's signature characteristics: its glowing red eyes. Joe Nickell, for example, has written several articles on the topic and based his identification of Mothman as a type of owl in part on this eyeshine observation, as it is characteristic of owls (see Nickell 2002, for example). Illustrations and depictions of Mothman (see Figures 1 and 2) typically feature the red eyes prominently, including those in *Mothman: Behind the Red Eyes*, by researcher and Mothman museum founder Jeff Wamsley. Nickell and others are of course correct that at least some, if not many or most, of the original sightings were likely of birds such as owls and cranes, with witness after witness explicitly describing what they'd seen as "like a bird," with "gray feathers," a "big bird," and so on.

The Mothman story—full of folklore, UFO-related embellishments, crypto-tourism, curses, and more—is both fascinating and extensive.

Figure 1. A collection of Mothman decals purchased at the Mothman Museum. Photo by the author.

However, a closer look at most of the accounts reveals that eyeshine is *not* in fact characteristic of Mothman sightings. In Wamsley's 2005 book, he includes firsthand eyewitness descriptions from nearly a dozen people who claim to have seen the creature or had some personal connection to it. Of those, only one person mentions glowing red eyes—a woman named Shirley Hensley, who admits that she herself didn't see

the eyes but reported that her *father* had described them as "like bike reflectors."

Several of the original eyewitnesses are claimed to have seen glowing red eyes, but that's not quite true. Linda Scarberry (who saw Mothman on November 15, 1966) specifically stated that the eyes did not glow red until a light was shined on them (more on that presently). In his book *Mothman and Other Curious Encounters*, Loren Coleman quotes Marcella Bennett (who saw the

Figure 2. The author at the Mothman statue in downtown Point Pleasant, West Virginia. Photo by the author.

creature the following night) as saying, "It rose up slowly from the ground. A big, gray thing. Bigger than a man, with terrible, glowing, red eyes" (Coleman 2002, 42). However, in a published interview with Wamsley, Bennett specifically contradicts Coleman's account: "I did not see any red eyes. I have never said that I had seen red eyes. I don't know if I was too frightened to even notice any type of red eyes at that time" (Wamsley 2005, 73). Either Bennett changed her story, or Coleman (or, less likely, Wamsley) got the important detail wrong—but in any event it's one of many examples of unnoticed (or unreconciled) contradictions in early Mothman accounts.

It's not surprising that most reports would not mention red eyeshine, because it is a function of *reflection*, not *projection*. In other words, the circumstances under which a person (such as Linda Scarberry) would report seeing eyeshine are only those in which a light (likely an artificial one such as a flashlight or vehicle headlights) is coming from (or from behind) the eyewitness and being reflected back at a specific angle. If the animal somehow *projected* lights from its eyes—that is, exhibited some unknown form of ocular bioluminescence—then presumably they would be routinely sighted in the dark woods like something in a *Scooby Doo* cartoon. Hunters could presumably hunt in complete darkness, taking aim at the glowing (i.e., light-emitting) eyes around them.

A closer look at most of the accounts reveals that eyeshine is *not* in fact characteristic of Mothman sightings.

Glowing Eyes of Legend

Many creatures—typically supernatural and often demonic—have been associated with glowing eyes in folklore. Examples include the chupacabra, black dogs, the Dover Demon, the Goatman, the rougarou, and others. In the case of other beasties, such as Bigfoot, glowing eyes are not characteristic but still occasionally reported. Red is the most common color, perhaps because it represents blood and danger; a creature with bright green glowing eyes might evoke more laughter than fear. That being said, the Nightwalkers in *Game of Thrones*, for example, are depicted as having cool blue glowing eyes; regardless of color, it's an effective tactic for demonstrating unnatural menace.

Eyeshine is a function of the tapetum lucidum, a layer of tissue directly behind the retina of some animals that reflects light back through the retina. It helps the animals see better in low light. It's common in many animals, including dogs and cats, and varies in color and reflectiveness. Human eyes lack tapeta, but a form of eyeshine is often noticed as "red eye" in flash photography, with light reflecting off a tissue layer called the fundus.

I was recently asked by a television producer to investigate the theory that owls or other birds could be responsible for at least some of the Mothman sightings. Recognizing that light-*reflecting* eyes were likely often incorrectly mistaken for light-*projecting* eyes, I conducted several informal field experiments to demonstrate the difference. How might each appear as seen from a distance in a dark wooded area?

Eyeshine Experiments

To examine this question, I visited the area where Mothman was first sighted: just off Fairgrounds Road near the TNT area in Point Pleasant, just before midnight. The setting was suitably eerie, between the tall woods and the moonless night, miles from the nearest town. It was cold and clammy with a brisk wind and the moisture of the forest wicking away heat. Though it was mostly silent, occasionally I heard sounds in the darkness surrounding me, possibly deer, hogs, skunks, or the like (roadkill served as a grim if imprecise indicator of local fauna). Nothing charged at me or fright-

Figure 3. Field experiment contrasting a light *projecting* source (left) from a light *reflecting* source (right) as seen in a dark wooded area, consistent with many Mothman sightings. Photo by the author.

ened me, but the conditions were clearly set for a scary experience if I'd happened to encounter an animal—pretty much any animal but especially one coming unexpectedly through the darkness from above, as many Mothman reports describe.

I purchased a set of four identical red bike reflectors and mounted them on a flat black foamcore platform, modifying two of them to emit light via a small low-powered LED. I took a series of photographs (as best I could in the extremely low light necessary to approximate the conditions under which the "eyes" might be seen) of both sets of emitting and reflecting lights, as well as side-by-side comparison. In Figure 3, for example, the glow on the left is being *projected*, while the much fainter light on the right is being *reflected*. I also made a few short videos demonstrating how light plays as it suddenly moves across reflective surfaces—as animal eyes might appear glimpsed in moving headlights or flashlights, for example (see Figure 4).

Owl Eyeshine

To get more insights into owl eyeshine and the behavior of large avians, I visited the Carolina Raptor Center in North Carolina. Experiments were conducted with different types of owls to gauge each species's relative eyeshine reflection. The marginally cooperative owls were coaxed to face me as I shined a light on them. The owl's scowl is arresting—as it's intended to be. The large, round, piercing eyes are unnerving and challenging. Many owls are apex predators and (unless injured, very young, or sick) have few if any natural predators. Most animals they encounter in the wild are weaker and make a good meal. Unless cornered, they're generally not afraid of many animals. I got several photos of prominent eyeshine in a natural setting (see Figure 5).

I was recently asked by a television producer to investigate the theory that owls or other birds could be responsible for at least some of the Mothman sightings.

I was allowed access to a restricted area where injured owls were completing rehabilitation in preparation for being released back into the wild. The area consisted of large rectangular wooden pens with T-bars at either end where the owls could fly back and forth, regaining wing strength. There were three owls in the pen with me, and several times an owl swooped down toward me. The first time it happened I was startled and alarmed; I had not seen or heard it coming, and then a seemingly large black form rushed toward me, coming within perhaps a foot of my head (see Figure 6). I had no time to react; it was gone before I realized what had happened. The entire flight was completely silent.

It could have easily flown around me but chose to swoop right past my head, seemingly more out of curiosity than threat. It happened four or five more times over the course of about half an hour, and it got only slightly less startling each time. Of course, I knew what was happening, and the area was lit with camera lights for the television crew. Plus, of course, there were no trees, shrubs, or anything else in the way. Owls are incredibly agile flyers, and videos can be found online depicting the animals flying through impossibly small crevices with ease. Had I been walking alone at night in dark woods, it would absolutely have been a strange and scary—possibly unexplained—experience. Having personally experienced the dive-bombing, I can tell you it was an unnerving experience.

Owls may or may not account for most Mothman sightings, but clearly they're responsible for many of them. A closer look at the reports reveals not only that glowing eyes are uncommon in Mothman accounts (as expected) but also that the descriptions typically match reflecting, not projecting, eyeshine. Sensational stories aside, glowing red eyes—evocative and creepy as they are—are merely folklore. ■

References

Coleman, Loren. 2002. *Mothman and Other Curious Encounters.* New York: Paraview Press.

Nickell, Joe. 2002. Mothman revisited: Investigating on site. *Skeptical Briefs* 12(4) (December).

Wamsley, Jeff. 2005. *Mothman: Behind the Red Eyes.* Point Pleasant, West Virginia: Mothman Press.

Figure 4. Field experiment depicting how two owl "eyes" might look if seen reflecting a light source in a dark wooded area, consistent with many Mothman sightings. Photo by the author.

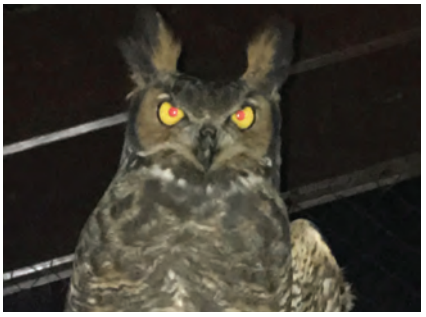


Figure 5. The glowing, judging eyes of a horned owl at the Carolina Raptor Center in Huntersville, North Carolina, reveals eyeshine reported by some Mothman eyewitnesses. Photo by the author.

Figure 6. The author being dive-bombed by a large, dark flying figure—in this case an owl—inside a rehabilitation pen at the Carolina Raptor Center in Huntersville, North Carolina. Photo by the author.

THE NOBEL DISEASE

WHEN INTELLIGENCE FAILS TO PROTECT AGAINST IRRATIONALITY

A surprising number of Nobel laureates in the sciences appear to have embraced decidedly weird ideas. The story of the so-called "Nobel Disease" bears intriguing implications for the field of skepticism.

CANDICE BASTERFIELD, SCOTT O. LILIENFELD, SHAUNA M. BOWES, AND THOMAS H. COSTELLO

No scientific award is more coveted than the Nobel Prize. In the eyes of the public, this prize, especially in the three traditional science categories of chemistry, physics, and physiology or medicine, is virtually synonymous with scientific brilliance. At the same time, the stories of the more than 600 Nobelists in the hard sciences pose a question that bears intriguing implications for the field of skepticism: To what extent do remarkable levels of intelligence immunize individuals against equally remarkable lapses in critical thinking? As we will discover, psychological research offers provisional answers to this question and tantalizing clues to its resolution.

Some authors have invoked the term *Nobel Disease* to describe the tendency of many Nobel winners to embrace scientifically questionable ideas (Gorski 2012). We adopt this term with some trepidation given its fraught implications. Some authors (e.g., Berezow 2016) appear to assume that Nobel winners in the sciences are more prone to critical thinking errors than are other scientists. It is unclear, however, whether this is the case, and rigorous data needed to verify this assertion are probably lacking.

In this article, we explore the more circumscribed question of whether and to what extent the Nobel Prize, conceptualized as a partial but imperfect proxy of scientific brilliance, is incompatible with irrationality. To do so, we draw on case studies of several Nobel-winning scientists who appear to have succumbed to the Nobel Disease. In doing so, we remain cognizant of the inferential limitations of case studies: They are of unknown representativeness, and they can be readily cherry picked to support one's hypotheses. Still, case studies can often be helpful in generating hypotheses to be investigated in more systematic studies. In addition, they can sometimes afford existence proofs—demonstrations that a given phenomenon can occur. In the case of the Nobel Disease, the capsule case histories we present strongly suggest that intellectual brilliance can coexist with yawning gaps in skeptical thinking.

Specifically, we offer brief descriptions of eight Nobel laureates in the sciences who embraced "weird" ideas. Following Shermer (2003), we define weird ideas as assertions that are (a) highly implausible in light of scientific knowledge; (b) roundly rejected by essentially all scientific experts; and (c) based mostly or exclusively on anecdotal or uncorroborated evidence. Because merely *entertaining the possibility* of an unsupported claim, such as the existence of extrasensory perception (ESP), does not indicate a critical thinking lapse, we focus on Nobelists who clung to one or more weird idea with considerable conviction.

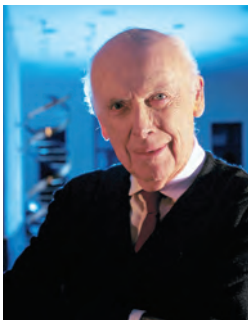
THE NOBEL DISEASE: EIGHT THUMBNAIL SKETCHES

Linus Pauling (1901–1994) received the 1954 Nobel Prize in Chemistry for research on the chemical bond (he also won the Nobel Peace Prize in 1962). In 1941, Pauling was diagnosed with Bright's disease, which causes chronic inflammation of the kidneys. He adopted a low-protein, salt-free diet and ingested vitamin supplements, attributing his improvement to the latter. He later claimed that 1,000 milligrams of vitamin C a day can reduce the incidence of common colds by 45 percent. Pauling reportedly consumed at least 12,000 milligrams of vitamin C daily, far above the recommended daily allowance of sixty milligrams. Studies in the 1970s and 1980s by Pauling and psychiatrist Ewan Cameron seemed to suggest that megadoses of vitamin C were helpful in prolonging terminal cancer patients' lives (Cameron and Pauling 1979). Nevertheless, the controls were not matched for age, stage of cancer, or quality of everyday functioning, rendering the data virtually uninterpretable. Furthermore, excess vitamin C is excreted through the urine and is of scant therapeutic value. Pauling also pursued the hypothesis that students' grades improved after drinking orange juice for several months. In an article in *Science*, as well as in other publications, Pauling (1968) further argued that megadoses of vitamin C are effective for schizophrenia. Controlled studies afford little support for this hypothesis (Hoffer 2008).

Excess vitamin C is excreted through the urine and is of scant therapeutic value.

William Shockley (1910–1989), along with John Bardeen and Walter Brattain, received the 1956 Nobel Prize in Physics for inventing the transistor. As a professor at Stanford University, Shockley's interests drifted into genetics. He argued without qualification that the Black vs. White IQ difference is largely or entirely genetic. He wrote, "My research leads me inescapably to the opinion that the major cause of the American Negro's intellectual and social deficits is hereditary and racial genetic in origin and thus not remediable to a major degree by practical improvements in environment" (*New Scientist* 1973, 432). He even maintained that "Nature has color-coded groups of individuals so that statistically reliable predictions of their adaptability to intellectual rewarding and effective lives can easily be made and profitably used by the pragmatic man-in-the street" (Shockley 1972, 307). Shockley endorsed the idea of "retrogressive evolution," proposing that Blacks were reproducing more rapidly than Whites, causing a decline in the population's overall intelligence. He promoted various radical solutions to this perceived problem, including offering financial incentives to genetically disadvantaged groups to undergo sterilization. Shockley donated his sperm to the Repository for Germinal Choice, pejoratively termed the "Nobel Prize sperm bank," established with the intent of creating a eugenics program (Morrice 2005). Shockley was also a fervent advocate of the polygraph ("lie detector") test, so much so that he once ordered his employees to take the test and proposed that Nobel laureates be asked the following question while connected to a polygraph machine: When you say there is no racial difference in IQ, do you really believe it? (Shurkin 1997, 241).

William Shockley argued without qualification that the Black vs. White IQ difference is largely or entirely genetic.



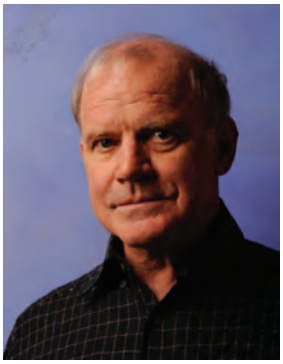
James Watson (1928–), like Shockley, has advanced several highly dubious claims about race. Watson, the 1962 Nobel Prize winner for codiscovering the structure of DNA along with Sir Francis Crick, has maintained categorically that Blacks are inherently less intelligent than Whites, a view he reiterated in a 2018 documentary. Watson has also suggested that obese people are less ambitious than other people; that exposure to sunlight in equatorial regions increases sexual urges; and that owing to their higher levels of melanin, dark-skinned people have a stronger sex drive than fair-skinned people (Brown 2001).

James Watson has advanced several highly dubious claims about race.

Brian Josephson (1940–) won the 1973 Nobel Prize in Physics "for his theoretical predictions of the properties of a supercurrent through a tunnel barrier" (Nobel Media AB 2019). In the late 1960s, Josephson became a follower of Maharishi Mahesh Yogi, the founder of transcendental meditation (TM), and argued that TM "allows traumatic experiences to come back unrepressed to the mind's eye" (*New Scientist* 1974, 416). In the early 1970s, Josephson launched the Mind-Matter Unification Project at Cambridge University to explore the relations between quantum mechanics and consciousness. In a booklet to mark the one-hundredth anniversary of the Nobel Prize, Josephson noted that he was working hard to keep the United Kingdom at the "forefront of research" on telepathy. In addition, Josephson has been a vocal advocate of "water memory," the purported mechanism underlying the debunked practice of homeopathy (Ernst 2010), which is premised on the notion that water can somehow "remember" the chemical properties of substances diluted in it. He has also promoted cold fusion, the discredited hypothesis that nuclear reactions can occur at room temperature.

Brian Josephson has been a vocal advocate of "water memory," the purported mechanism underlying the debunked practice of homeopathy.

Nikolaas Tinbergen (1907–1988), along with Karl von Frisch and Konrad Lorenz, shared the 1973 Nobel Prize in Physiology or Medicine for his discoveries on the organization and causes of animal behavior (ethology). After receiving this prize, Tinbergen applied his ethological theories to autism spectrum disorder. His environmental hypotheses concerning the etiology of autism were highly speculative and inconsistent with burgeoning evidence at the time that this condition is primarily of genetic and neurological origin (Folstein and Rutter 1977). His work culminated in a book coauthored with his wife (Tinbergen and Tinbergen 1985) recommending "holding therapy" as a treatment for autism. This technique is based on the unsupported position that autism is caused by a defective attachment of child to mother, leading to interpersonal withdrawal and communication problems. According to Tinbergen, to cure autism parents must hold their children for long periods of time while trying to establish eye contact with them, even if they resist it. Subsequent data have indicated that holding therapy is empirically unsupported and can in some cases be physically dangerous (Mercer 2013).



Kary Mullis (1944–2019) shared the Nobel Prize in Chemistry in 1993 with Michael Smith for creating polymerase chain reaction (PCR), which allows a small amount of DNA to be copied rapidly billions of times. Mullis expressed forceful disagreement with the view that AIDS is caused by the human immunodeficiency virus (HIV). He claimed that this retrovirus is barely detectable in people with AIDS, maintaining that this finding raises serious questions concerning its role in the illness: "Years from now, people will find our acceptance of the HIV theory of AIDS as silly as we find those who excommunicated Galileo" (Mullis 1998, 180). Mullis also questioned the evidence for human-made global warming, stating on his website that "we have no good reason to think we understand climate. To make predictions about what follows from here and when, and to audaciously begin the discussion by implicating our humble species in the whole thing is worse than audacious, it's pathetic." In his autobiography, he endorsed several other strange ideas, saying that he once encountered a fluorescent raccoon that spoke to him (addressing him as "doctor") and suggesting that the raccoon might have been an alien. In this book, Mullis also professed belief in astrology, asking rhetorically, "How could an institution of higher learning grant someone a Ph.D. in psychology without requiring at least a few courses in astrology?" (Mullis 1998, 151).

Kary Mullis endorsed several strange ideas, saying that he once encountered a fluorescent raccoon that spoke to him.

Louis J. Ignarro (1941–), along with Robert Furchgott and Ferid Murad, received the 1998 Nobel in Physiology or Medicine for his discoveries concerning nitric oxide as a signaling molecule in the cardiovascular system. The discovery facilitated the development of new medications to treat cardiovascular disease, as well as of Viagra. A few years after receiving the Prize, Ignarro was hired as a consultant for Herbalife, a company that develops and markets empirically unsupported dietary supplements and vitamins, and became a member of its Scientific Advisory Board. Ignarro worked with Herbalife to promote a dietary supplement, Niteworks, a powdery mix of amino acids and antioxidants that purportedly boosts the body's nitric oxide production. In 2004, Ignarro and his colleagues published a controlled study in mice touting the benefits of Niteworks's ingredients (Napoli et al. 2004). Despite the unverified applicability of Niteworks to humans, Ignarro was quoted as saying, "What's good for mice is good for humans" (Evans 2004).

Louis J. Ignarro was hired as a consultant for Herbalife, a company that develops and markets empirically unsupported dietary supplements and vitamins.

Luc Montagnier (1932–) and Françoise Barré-Sinoussi received the 2008 Nobel Prize in Physiology or Medicine for their discovery of HIV. One year later, Montagnier published two papers in *Interdisciplinary Sciences: Computational Life Sciences*, a journal he founded and edited. In one of them, he maintained that diluted DNA from pathogenic bacterial and viral species can emit electromagnetic waves. When asked about his views about homeopathy, Montagnier responded: "I can't say that homeopathy is right in everything. What I can say now is that the high dilutions are right. … even at [a dilution of] 10^{-18}, you can calculate that there is not a single molecule of DNA left. And yet we detect a signal" (Enserink 2010). Montagnier further claimed that most neurological diseases arise from electromagnetic waves emitted from viral or bacterial DNA in aqueous solutions (Montagnier et al. 2009). He also claims that vaccines cause autism and that autism can be successfully treated using antibiotics.

THE NOBEL DISEASE: OTHER EXAMPLES

These eight individuals are merely a subset of Nobel laureates who have held weird ideas. Others include:

- Phillip Lenard, who won the Nobel Prize in Physics in 1905 for his research on cathode rays, and Alexis Carrel, who won the Nobel Prize in Physiology or Medicine in 1912 for the invention of the perfusion pump; both promoted eugenics and Nazi racial theories (Carrel 1935; Gunderman 2015).
- Portuguese neurosurgeon Egas Moniz won the Nobel Prize in Physiology or Medicine in 1949 for prefrontal lobotomy. At a conference, Moniz learned that severing the connections between the frontal lobes and the rest of the brain rendered chimpanzees docile; he then deduced that frontal lobotomy could be used to treat serious mental illness in humans and actively promoted it for this purpose (Tan and Yip 2014).
- Still, other examples of Nobelists venturing into doubtful scientific territory include Julian Schwinger (Nobel Prize in Physics in 1966 for work on quantum electrodynamics), who authored several theoretical articles on cold fusion; Ivar Giaver (Nobel Prize in Physics in 1973 for work on electron tunneling in superconductors), who has repeatedly professed skepticism concerning global warming; Arthur Schawlow (Nobel Prize in Physics in 1981 for the co-invention of the laser), who was a vocal advocate of the scientifically debunked practice of facilitated communication for autism (he appeared in the 1994 *Frontline* documentary *The Prisoners of Silence*); Richard Smalley (Nobel Prize in Chemistry in 1996 for the discovery of a third form of carbon), who has promoted anti-Darwinist ideas (Smalley 2005); and Wolfgang Pauli (Nobel Prize in Physics in 1945 for his discovery of the exclusion principle), who along with psychiatrist Carl Jung proposed the idea of synchronicity, a mystical phenomenon whereby events labeled as coincidences supposedly reveal an acausal connection between mental and physical experiences (Donati 2004).

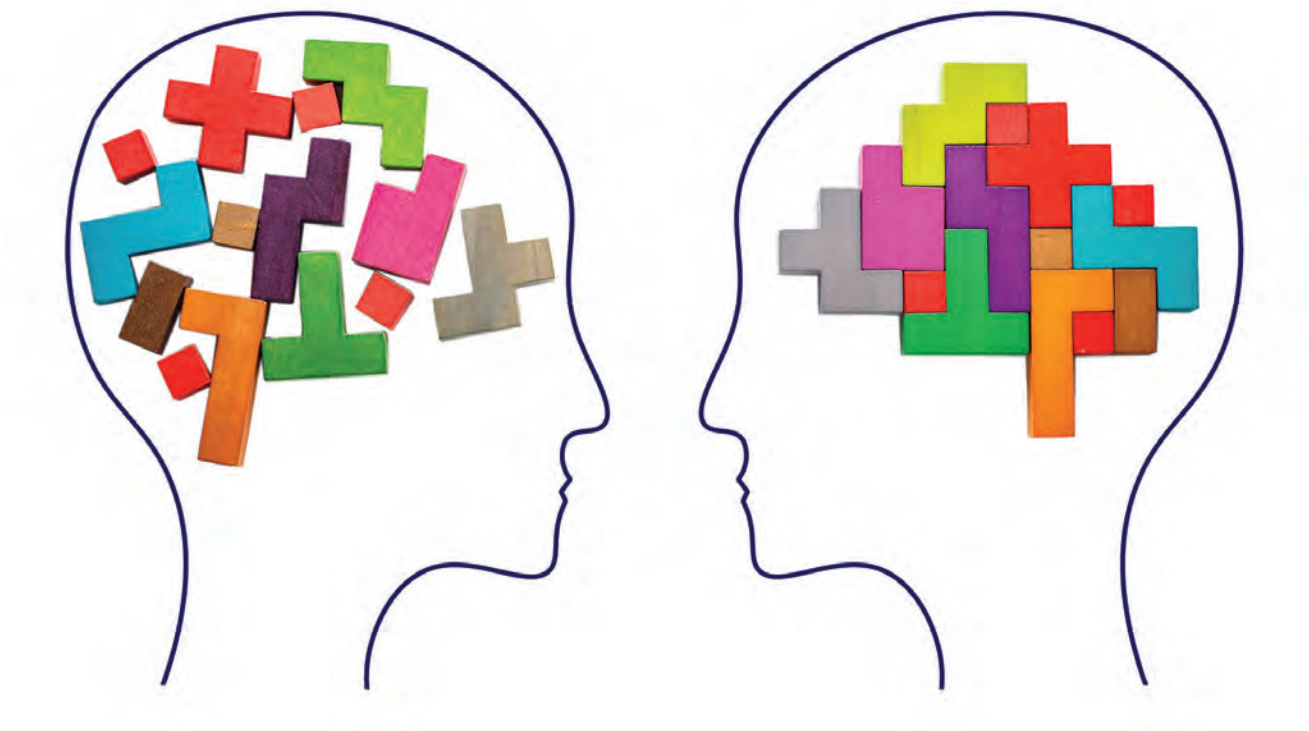
INTELLIGENCE AND RATIONALITY: IMPLICATIONS FOR SKEPTICISM

It perhaps goes without saying that Nobel laureates are not the only brilliant scientists to fall prey to questionable ideas. Alfred Russel Wallace, codiscoverer of the theory of natural selection along with Charles Darwin, advocated spiritualism and believed that nonmaterial forces explained the evolution of the human mind (Bensley 2006). Percival Lowell, a pioneer in planetary astronomy whose observations paved the way for the discovery of Pluto (Sharps et al. 2019), was convinced that he had discovered martian canals of intelligent origin. More recently, William Happer, a retired Princeton physicist whose discoveries facilitated higher-quality images of people's lungs and astronomical objects, has forcefully rejected the scientific consensus on climate change (CO_2 Coalition 2016).

The Nobel Disease, along with the stories of these three scientists, strongly suggest that high levels of general intelligence, traditionally conceptualized as the capacity to analyze and evaluate information, do not preclude high levels of irrational thinking (Shermer 2003; Stanovich 2009; Sternberg 2004). Intelligence tends to be only modestly correlated with immunity to most cognitive biases, such as confirmation bias and neglect of base rates (Stanovich and West 2008), consistent with the observation that even exceedingly smart people can fall prey to thinking errors. Whereas scores on intelligence measures reflect *maximal* performance (how well people *can* perform when pushed to the limit), scores on most cognitive bias measures reflect *typical* performance (how well people *generally* perform in everyday life) (Cronbach 1960). Therefore, even highly intelligent people may neglect to exercise their critical thinking capacities when they are insufficiently motivated to do so, especially when they are certain they are right. Although highly intelligent individuals may be more capable than other individuals of subjecting ideas to skeptical scrutiny, they may not always feel compelled to do so (Bensley 2006).

It perhaps goes without saying that Nobel laureates are not the only brilliant scientists to fall prey to questionable ideas.

Preliminary evidence further suggests that intelligent people may have a somewhat larger *bias blind spot* than other people, meaning they are less aware of their propensity toward biases (Stanovich et al. 2013). Some authors have further argued that high levels of intelligence may exacerbate the risk of critical thinking failures; for instance, Sternberg (2004) proposed that several cognitive errors prevalent among the highly intelligent can predispose to irrationality; several may account for the weird ideas of some Nobel laureates. *Unrealistic optimism* occurs when people believe that because they are smart, they need not worry about intellectual errors. The *sense of omniscience* arises when people believe they are so intelligent that they know virtually everything. The *sense of invulnerability* emerges when people believe they are so smart that they are essentially immune to mistakes. If Sternberg is correct, by virtue of their high intellect Nobel laureates may be at risk for peculiar ideas, especially if they are not sufficiently intellectually humble.



Because personality data suggest that highly creative scientists tend to be more self-confident than other scientists (Feist 1998), intellectual humility may be more the exception than the rule among Nobel laureates in the sciences. As a consequence, Nobelists may need to be on guard against "intellectual overreach," the mistake of assuming that because one is an expert in one domain, one is likely to display comparable levels of expertise in other domains (Dubner 2014).

In closing, our admittedly limited sample of Nobel Disease case studies reminds us that we should not confuse intelligence with rationality, nor confidence with correctness. They also remind us that we should be careful not to suspend our scientific skepticism even in the face of pronouncements by the most accomplished of scientists. ■

Even highly intelligent people may neglect to exercise their critical thinking capacities when they are insufficiently motivated to do so, especially when they are certain they are right.

Portions of this article were adapted with permission by Cambridge University Press from S.O. Lilienfeld, C. Basterfield, S.M. Bowes, and T.H. Costello, 2020. *Nobelists Gone Wild*: *Case Studies in the Domain-Specificity of Critical Thinking*. In R.J. Sternberg and D. Halpern (Eds.). *Critical Thinking in Psychology* (2nd edition). New York: Cambridge University Press.

References

Bensley, A.B. 2006. Why great critical thinkers sometimes fail to think critically. Skeptical Inquirer 30(4): 47–52.

Berezow, A. 2016. Paul Krugman now has Nobel Disease. *American Council on Science and Health*. Available online at https://www.acsh.org/news/2016/12/18/paul-krugman-now-has-nobel-disease-10609.

Brown, P. 2001. Watson's 'sun and sex' lecture upsets audience. *Nature Medicine* 7: 137.

Cameron, E., and L.C. Pauling. 1979. *Cancer and Vitamin C*. Corvallis, Oregon: Linus Pauling Institute of Science and Medicine.

Carrel, A. 1935. *Man, the Unknown*. New York: Doubleday.

CO_2 Coalition. 2016. Happer's Statement: CO_2 Will Be a Major Benefit to the Earth (November 29). Available online at https://co2coalition.org/2016/04/30/happers-statement-co2-will-be-a-major-benefit-to-the-earth/.

Cronbach, L.J. 1960. *Essentials of Psychological Testing* (2nd ed.). Oxford, UK: Harper.

Donati, M. 2004. Beyond synchronicity: The worldview of Carl Gustav Jung and Wolfgang Pauli. *Journal of Analytical Psychology* 49: 707–728.

Dubner, S. 2014. Intellectual Overreach (July 24). Available online at https://www.youtube.com/watch?v=6hbnFQu4Cgw.

Enserink, M. 2010. French Nobelist escapes "intellectual terror" to pursue radical ideas in China. *Science* 330: 1732–1733.

Ernst, E. 2010. Homeopathy: What does the "best" evidence tell us. *Medical Journal of Australia* 192: 458–460.

Evans, D. 2004. Nobel Prize Winner Didn't Disclose His Herbalife Contract. Available online at https://culteducation.com/group/969-herbalife/9601-nobel-prize-winner-didnt-disclose-his-herbalife-contract.html.

Feist, G. J. 1998. A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review* 2: 290–309.

Folstein, S., and M. Rutter. 1977. Genetic influences and infantile autism. *Nature* 265: 726–728.

Gorski, D. 2012. Luc Montagnier and the Nobel Disease. *Science Based Medicine*. Available online at https://sciencebasedmedicine.org/luc-montagnier-and-the-nobel-disease/.

Gunderman, R. 2015. When science gets ugly—the story of Philipp Lenard and Albert Einstein. *The Conversation*. Available online at https://theconversation.com/when-science-gets-ugly-the-story-of-philipp-lenard-and-albert-einstein-43165.

Hoffer, L.J. 2008. Vitamin therapy in schizophrenia. *Israel Journal of Psychiatry and Related Sciences* 45: 3–10.

Mercer, J. 2013. Holding therapy: A harmful mental health intervention. *Focus on Alternative and Complementary Therapies* 18: 70–76.

Montagnier, L., J. Aïssa., S. Ferris, et al. 2009. Electromagnetic signals are produced by aqueous nanostructures derived from bacterial DNA sequences. *Interdisciplinary Sciences: Computational Life Sciences* 1: 81–90.

Morrice, P. 2005. 'The genius factory': Test-tube superbabies. *The New York Times* (July 3). Available online at https://www.nytimes.com/2005/07/03/books/review/the-genius-factory-testtube-superbabies.html.

Mullis, K. 1998. *Dancing Naked in the Mind Field*. New York: Vintage Books.

Napoli, C., S. Williams-Ignarro., F. De Nigris, et al. 2004. Long-term combined beneficial effects of physical training and metabolic treatment on atherosclerosis in hypercholesterolemic mice. *Proceedings of the National Academy of Sciences* 101: 8797–8802.

New Scientist. 1973. Case for the plaintiff. *New Scientist* 57: 434–436.

———. 1974. Josephson on transcendental meditation. *New Scientist* 62(898): 416.

Nobel Media AB. 2019. Brian D. Josephson-Facts. Available online at https://www.nobelprize.org/prizes/physics/1973/josephson/facts/.

Pauling, L. 1968. Orthomolecular psychiatry. *Science* 160: 265–271.

Sharps, M.J., S. Hurd, B. Hoshiko, et al. 2019. Percival Lowell and the canals of Mars, part II: How to see things that aren't there. Skeptical Inquirer 43(6): 48–51.

Shermer, M. 2003. Why smart people believe weird things. *Skeptic* 10(2): 62–73.

Shockley, W. 1972. Dysgenics, geneticity, raceology: A challenge to the intellectual responsibility of educators. *The Phi Delta Kappan* 53: 297–307.

Shurkin, J.N. 1997. *Broken Genius*. New York: Macmillan.

Smalley, R. 2005. Creation Scientists Applaud PA Judge's Ruling against Intelligent Design [Press release]. Available online at http://www.freerepublic.com/focus/religion/1546528/posts.

Stanovich, K.E. 2009. *What Intelligence Tests Miss: The Psychology of Rational Thought*. New Haven, CT: Yale University Press.

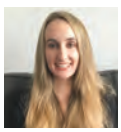
Stanovich, K.E., and R.F. West. 2008. On the relative independence of thinking biases and cognitive ability. *Journal of Personality and Social Psychology* 94: 672–685.

Stanovich, K.E., R.F. West, and M.E. Toplak. 2013. Myside bias, rational thinking, and intelligence. *Current Directions in Psychological Science* 22: 259–264.

Sternberg, R.J. 2004. Why smart people can be so foolish. *European Psychologist* 9: 145–150.

Tan, S.Y., and A. Yip. 2014. António Egas Moniz (1874–1955): Lobotomy pioneer and Nobel laureate. *Singapore Medical Journal* 55: 175–176.

Tinbergen, N., and E.A. Tinbergen. 1985. *Autistic Children: New Hope for a Cure*. London: George Allen & Unwin.



Candice Basterfield has an MA in neuropsychology from the University of Melbourne (Australia).

Scott O. Lilienfeld, PhD, is Samuel Candler Dobbs Professor of Psychology at Emory University (Atlanta) and is a member of the CSI Executive Council.

Shauna M. Bowes and Thomas H. Costello are advanced graduate students in psychology at Emory University.

Using Humor and Games to Counter Science Misinformation

Science is necessary but insufficient to successfully counter science denial. Solutions commensurate with the scale of the problem require the combined efforts of science, art, and technology.

JOHN COOK

Science denial and misinformation are having a bit of a moment. In recent years, the terms *post-truth* and *fake news* have been named word of the year by various dictionaries. Flat-earthers achieved newfound exposure—though not necessarily support—with a 2018 Netflix documentary, and the current U.S. president is a climate change denier and anti-vaxxer.

These developments have real world consequences. Preventable diseases are making a comeback. Policies to mitigate climate change have been delayed decades. Segments of the population are failing to practice social distancing due to COVID-19 misinformation.

What we're built for vs. what we face now

How can science denial be flourishing two decades into the twenty-first century? Ironically, our modern lifestyle is a contributor. Social media have exacerbated the problem, making it much easier to quickly and widely disseminate misinformation. By making irrelevant the traditional gatekeepers of conventional media, an individual can potentially reach as many people as mainstream media outlets. Further, social media platforms have a financial interest in delivering content that maximizes clicks and interactions. So they facilitate the development of echo chambers by delivering content that conforms to peoples' preexisting beliefs.

However, we can't blame it all on social media. Underneath the facade of modern technology lies psychological challenges that make it more difficult for us to understand and accept scientific reality—and even harder to fix the problem.

How can science denial be flourishing two decades into the twenty-first century? Ironically, our modern lifestyle is a contributor.

Take, for example, an issue such as climate change, which is uniquely difficult for our minds to grasp. Climate change is planetary in scale, spans timeframes of decades to centuries, and is caused collectively by the global human population. In contrast, the human brain has evolved to deal with immediate, short-term dangers such as predators jumping out of bushes.

Ultimately, the solution to science denial lies in psychology and building public resilience against misinformation. But again, we face steep psychological challenges. People think in two different ways: instinctive, fast thinking and more reasoned, slower thinking. Summoning the critical thinking to assess arguments and discern reasoning fallacies requires slow, methodical thinking. This takes great cognitive effort, because most of our thinking is fast and automatic. Our brains are hardwired to escape those predators jumping out of bushes.

So how do we tackle the psychological, technological, and social challenges that make misinformation and science denial such a daunting problem? Science does hold the answers to science denial. But I've come to the conclusion that science, while necessary, is insufficient in itself to meet the challenge of science denial. I have taken a long, meandering journey to arrive at that conclusion.

From Science to Art and Back to Science

I began my career studying physics at the University of Queensland in Australia. While completing my honours degree, I found myself drawing cartoons in my spare time in the margins of my lecture notes. Upon graduation, I made the dramatic career change from physics to cartooning. But while my days were spent drawing, I found myself doing science in my spare time. You can take the boy out of the science, but you can't take the science out of the boy.

I then launched my website SkepticalScience.com. The approach of the website was simple: debunk misinformation about climate change with peer-reviewed science. Coming from a background in physical science, my approach was based on the naive notion that all I had to do to successfully debunk misinformation was provide the scientific facts.

Then out of the blue, I received an email from a cognitive scientist who shared some psychological research into debunking, including a study finding that when you debunk myths in the wrong way, you run the risk of reinforcing the myth rather than refuting it. To my horror, I discovered that I had been debunking myths in the wrong way!

That email proved to be life changing, because it opened my eyes to the science of science communication. I immersed myself in the psychological research into misinformation, eventually embarking on a PhD in psychology researching how to counter misinformation.

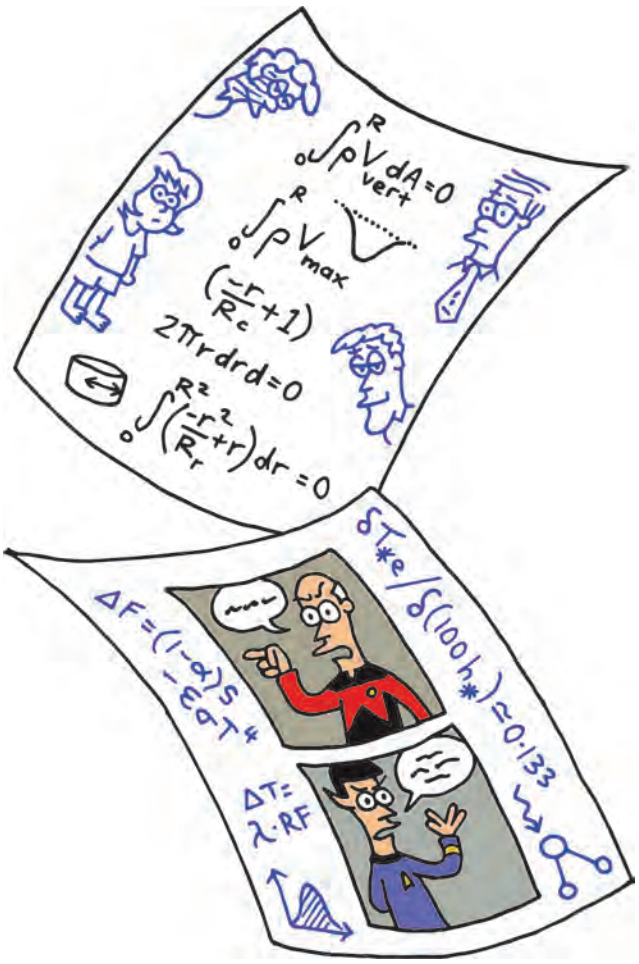
Just a Bit of Science Denial

After five years of doctoral research and around twenty published papers, I had found the answer to science denial: inoculation (Cook et al. 2017). For half a century, psychology researchers showed in experiment after experiment that if you expose people to a weak form of misinformation, they built up immunity so that stronger misinformation has less influence on them (Compton 2013). This approach is known as inoculation, borrowing the metaphor from medical vaccination and applying it to knowledge. Misinformation is delivered in a weakened form by including two elements: a warning of the danger of being misled and counterarguments explaining the misleading techniques employed by the misinformation.

Having landed upon the solution of inoculation, the next question was how to practically implement this approach to counter climate misinformation. I turned to two critical thinking philosophers, Peter Ellerton and David Kinkead, developing a methodology for systematically deconstructing and analyzing misinformation (Cook et al. 2018). We applied this process to fifty of the most common myths about climate change. In each case, we showed that each myth contained reasoning errors and identified the logical fallacy in each.

Once you identify the logical fallacy in a piece of misinformation, what's the best way to explain how misinformation misleads the public and then inoculate people against it? My philosopher colleagues introduced me to the concept of *parallel argumentation*: explaining the flaw in an argument by transplanting the same logic into a parallel situation, often an extreme or absurd one. A lightbulb moment for me was the realization that this technique was used every evening by late night comedians. The beauty of parallel argumentation is it debunks false arguments by exposing bad logic, sidestepping the need to provide long, complicated explanations. It can also be highly accessible to the general public—not to mention humorous.

Ultimately, the solution to science denial lies in psychology and building public resilience against misinformation.


$\int_0^R \rho V_{vert} dA = 0$
$\int_0^R \rho V_{max} \left(\frac{-r}{R_c}+1\right) 2\pi r dr d = 0$
$\int_0^{R^2} \left(\frac{-r^2}{R_r}+r\right) dr = 0$
$\Delta F = (1-\alpha) S - \varepsilon \sigma T^4$
$\delta T^*_e / \delta (100 h^*) \approx 0.133$
$\Delta T = \lambda \cdot RF$

Physics lecture notes with cartoons in the margins and cartoons with scientific equations in the margins

Top: a common climate denial talking point. Bottom: transplanting the logic of the denial talking point into a parallel situation.

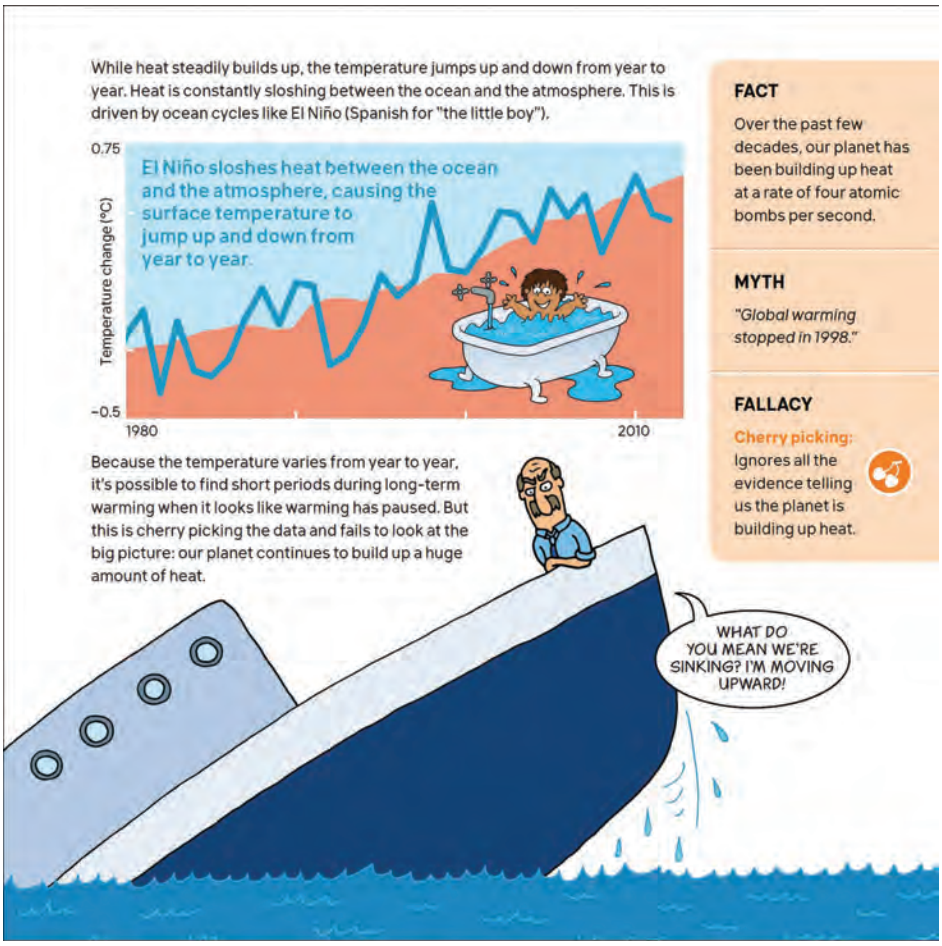
The Double-Edged Sword of Humor

The exciting potential of parallel argumentation led me into a new line of research: using humor to counter science misinformation. Existing research into comedy as a science communication tool found that the humorous approach was often a double-edged sword; benefits seemed to come with a potential drawback.

For example, communicating about a sober, intimidating topic such as climate change with humor makes the issue less threatening and more accessible (Boykoff and Osnes 2018). Humorous messages are also more effective with disengaged audiences (Brewer and McKnight 2015). However, the downside of humor is that people can come away less concerned about climate change relative to a serious climate message (Bore and Reid 2014).

One negative trait of humorous messages is that they are perceived as less informative than serious messages, even when containing the exact same information (Skurka et al. 2018). But on the positive side, people show less counterarguing against humorous messages. There is some intriguing research finding a sleeper effect in response to a comedy routine, where the message became more persuasive after one week (Nabi et al. 2007).

In the face of these mixed results, I began a series of experiments with my George Mason University colleagues Emily Vraga and Sojung Kim, measuring the impact of using humor to debunk science misinformation. We tested debunking misinformation across different issues, such as climate change, gun control, and vaccination, and found that debunking was most effective on topics where views were softest: vaccination (Vraga et al. 2019).


While heat steadily builds up, the temperature jumps up and down from year to year. Heat is constantly sloshing between the ocean and the atmosphere. This is driven by ocean cycles like El Niño (Spanish for "the little boy").
0.75
-0.5
Temperature change (°C)
El Niño sloshes heat between the ocean and the atmosphere, causing the surface temperature to jump up and down from year to year.
1980
2010
FACT
Over the past few decades, our planet has been building up heat at a rate of four atomic bombs per second.
MYTH
"Global warming stopped in 1998."
FALLACY
Cherry picking: Ignores all the evidence telling us the planet is building up heat.
Because the temperature varies from year to year, it's possible to find short periods during long-term warming when it looks like warming has paused. But this is cherry picking the data and fails to look at the big picture: our planet continues to build up a huge amount of heat.
WHAT DO YOU MEAN WE'RE SINKING? I'M MOVING UPWARD!

Excerpt from *Cranky Uncle vs. Climate Change*, anthropomorphizing ocean cycles (*El Niño* is Spanish for "little boy") and employing a cherry-picking parallel argument to debunk the climate myth that global warming stopped in 1998.

Our ongoing research has employed eye tracking to determine that both serious and humorous corrections are effective but in different ways. Using mediation analysis, we found that the way that serious refutations reduced the credibility of misinformation was because they are seen as more credible. In contrast, by incorporating eye-tracking data into our mediation analysis, we found that humorous cartoons were successful in discrediting misinformation because people spent more time paying attention to the cartoons.

Outside of the lab, I've also put these research findings into practice in the form of a book, *Cranky Uncle vs. Climate Change*. The book uses cartoons in a variety of forms to make the science both clearer and more engaging. These techniques include anthropomorphism to make natural phenomena

more relatable, personification of climate denial in the form of the ubiquitous cranky uncle, and parallel arguments to explain the fallacies in climate misinformation.

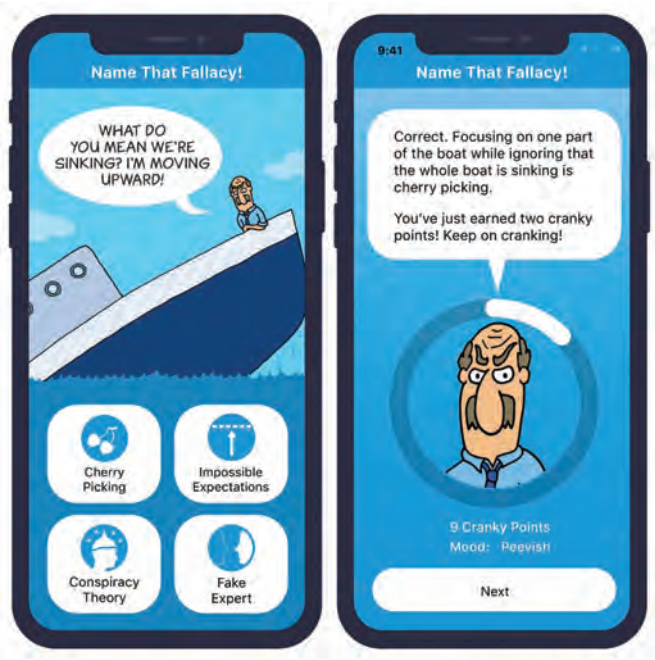
Seriously Funny Games

Cartoon humor is also suited to another platform: games. Applying gamification to education is known as "serious games," taking advantage of a range of gaming tools and techniques that help enhance the education process. For example, achievement rewards offer learning incentives (Blair et al. 2016), while leaderboards and player-to-player features add social and community elements (Paavilainen et al. 2017).

Gamification offers a powerful solution to science denial. Developing public resilience to misinformation requires teaching critical thinking, which is challenging because of the human preference for fast, automatic thinking over effortful, slow thinking. However, gamification incentivizes players to practice critical thinking. Through repeated quizzes where players spot fallacies in bad arguments, a slow thinking process can be turned into a fast thinking heuristic. It may be that the best thing to stop bad heuristics is good heuristics.

I've adapted the research and art that went into the *Cranky Uncle vs. Climate Change* book into a smartphone game where Cranky Uncle mentors players into learning the techniques of science denial to become a cranky uncle themselves. One danger of serious games is players can lose motivation to play if they see the game as all education and no fun. By using a sassy cartoon mentor and humorous examples of logical fallacies, we avoid this pitfall by packaging the game as a seriously funny game.

The *Cranky Uncle* game has been tested in college classes across the country. Just a half hour of playing a prototype of the game has been found to improve students' ability to identify a range of different logical fallacies. While the game focuses on climate misinformation, students showed improvement in spotting misleading techniques across a range of topics. Researchers call this the "umbrella of protection": inoculating against misinformation in one topic conveys resistance across multiple topics (Parker et al. 2012).


Name That Fallacy!
WHAT DO YOU MEAN WE'RE SINKING? I'M MOVING UPWARD!
Cherry Picking
Impossible Expectations
Conspiracy Theory
Fake Expert
9:41
Name That Fallacy!
Correct. Focusing on one part of the boat while ignoring that the whole boat is sinking is cherry picking.
You've just earned two cranky points! Keep on cranking!
9 Cranky Points
Mood: Peevish
Next

Screenshots of the *Cranky Uncle* smartphone game.

Science + Art + Technology

While there has been a great deal of scientific research into understanding and countering misinformation, the scientific community has struggled to keep up with the explosion of misinformation campaigns. Science denial has taken advantage of the tools offered by technological platforms.

Science is necessary but insufficient to counter science denial—it also needs allies. Fortunately, there are two powerful allies in art and technology. Art enables communicators to package scientific information in entertaining formats to attract the attention of disengaged audiences. Technology allows us to disseminate interactive games at a scale commensurate with the problem. ■

References

Blair, L., C. Bowers, J. Cannon-Bowers, et al. 2016. Understanding the role of achievements in game-based learning. *International Journal of Serious Games* 3(4): 47–56.

Bore, I.L.K., and G. Reid. 2014. Laughing in the face of climate change? Satire as a device for engaging audiences in public debate. *Science Communication* 36(4): 454–478.

Boykoff, M., and B. Osnes. 2018. A laughing matter? Confronting climate change through humor. *Political Geography*.

Brewer, P.R., and J. McKnight. 2015. Climate as comedy: The effects of satirical television news on climate change perceptions. *Science Communication* 37(5): 635–657.

Compton, J. 2013. Inoculation theory. *The SAGE Handbook of Persuasion: Developments in Theory and Practice*, 220–236.

Cook, J., P. Ellerton, and D. Kinkead. 2018. Deconstructing climate misinformation to identify reasoning errors. *Environmental Research Letters* 11(2).

Cook, J., S. Lewandowsky, and U. Ecker. 2017. Neutralizing misinformation through inoculation: Exposing misleading argumentation techniques reduces their influence. *PLOS ONE* 12(5): e0175799.

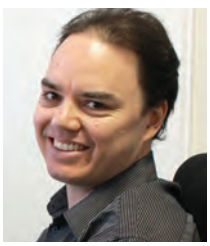
Nabi, R.L., E. Moyer-Gusé, S. and Byrne. 2007. All joking aside: A serious investigation into the persuasive effect of funny social issue messages. *Communication Monographs* 74(1): 29–54.

Paavilainen, J., K. Alha, and H. Korhonen. 2017. A review of social features in social network games. *Transactions of the Digital Games Research Association* 3(2).

Parker, K.A., B. Ivanov, and J. Compton. 2012. Inoculation's efficacy with young adults' risky behaviors: Can inoculation confer cross-protection over related but untreated issues? *Health Communication* 27(3): 223–233.

Skurka, C., J. Niederdeppe, R. Romero-Canyas, et al. 2018. Pathways of influence in emotional appeals: Benefits and tradeoffs of using fear or humor to promote climate change-related intentions and risk perceptions. *Journal of Communication* 68(1): 169–193.

Vraga, E.K., S.C. Kim, and J. Cook. 2019. Testing logic-based and humor-based corrections for science, health, and political misinformation on social media. *Journal of Broadcasting & Electronic Media* 63(3): 393–414.



John Cook is a research assistant professor with the Center for Climate Change Communication at George Mason University, a CSI fellow, and founder of SkepticalScience.com. He is the author of the book *Cranky Uncle vs. Climate Change* and creator of the smartphone game *Cranky Uncle*, which both use cartoons and critical thinking to counter climate misinformation.

Multiply Connected

The Expanding Universe of Science Fiction, Science Fact, and Science Communication

Scientists have consulted with science fiction creators for years. Science communicators have interacted with the public for a long time, too. Nowadays, science fiction, science fact, and science communication are becoming more interconnected.

DAVID R. POWELL

Following the September 1966 premiere of the original series *Star Trek*, which creator Gene Roddenberry called "the first true SF series ever made on television" (Solow and Justman 1996, 301), the show garnered the attention of none other than Isaac Asimov. Asimov wrote a review of *Star Trek* for *TV Guide* in which he (as Roddenberry would later describe it) damned it with faint praise. Asimov's comments included what he saw as *Star Trek*'s lack of scientific accuracy. (Roddenberry replied to Asimov, defending *Star Trek*'s attempts to guarantee scientific accuracy, straightening out Asimov on what it is like to do so within production constraints, and he eventually won Asimov over as an outspoken supporter of the show.)

By 1979, when *Star Trek: The Motion Picture* was released, the notion of a (credited) technical adviser had come along. Jesco von Puttkamer, a NASA aerospace engineer and science fiction author, consulted with Gene Roddenberry to explain the "multiply connected" universe that makes wormholes possible (von Puttkamer 1980, 25). In general, science consulting in science fiction such as *Star Trek* would involve a process of finding something in or on the cutting edge of real science—or, failing that, inventing new, though plausible, "science"—that will fit the dramatic needs of a story (Bormanis 1998).

Andre Bormanis (1998, viii) would also say, "*Star Trek* can't be *Nova*" and the "purpose [of *Star Trek*] has never been to teach science." However, the multiple connections among science fiction, science fact, consultants, communicators, and consumers provide avenues not just of inspiration to educate oneself about science but for education itself and for reflection on the human condition through creative science communication.

Science communication has not been uncontroversial, especially when practiced by scientists themselves. However, as Sir Walter Bodmer, the chair of the *ad hoc* group that produced the 1985 report "The Public Understanding of Science" for the Royal Society of London, said in 2011, "it is now an accepted part of any scientist's activities and there is no longer any stigma for a scientist to be involved in the public communication of science" (Bodmer 2011, xiii). Not only are there scientists who engage enthusiastically in the public communication of science, some do it via the medium of science fiction, which has itself sometimes been looked down upon in literary circles. So what do some of these multiple connections look like, and what are some of the questions that they still raise?

"In space no one can hear you scream," noted the movie poster for the 1979 film *Alien*. Apparently, though, you *can* hear spaceship engines and exploding Death Stars. When analyzing films for their scientific content (or just being a picker of nits) sound in space is one of the standard examples of a piece of science fiction failing to get the science right. What those who point out this oft-repeated slip are looking for is portrayal of scientifically accurate phenomena. Ideally, instances of physical phenomena portrayed will not violate the laws of physics, for example. At some point, however, the desire to depict accurate science in fictional contexts (say, by the scientist acting as consultant on the project) encounters the dramatic demands of the film (or other medium) and its creators. A compromise must be reached between the "veritable truth" as established by science and the "dramatic truth." Veritable truth is interpreted to be "entertaining and commercially viable … once it is filtered through the social and structural limitations imposed upon it by the filming process" (Frank 2003, 432). Consultants and creatives reach the best compromises when "perceptual reality," the portrayed phenomenon, has sufficient points of contact to be convincing with "referential reality," that which actually occurs or exists (Frank 2003).

There are few things more dramatically truthful than the threat to throw someone out an airlock, with the implied exposure to cold, empty space. Ellen Ripley opens an airlock to attempt to blow the Xenomorph out into space in the film *Aliens*. She is also exposed and hanging on desperately. "While immediate exposure would … cause blood to boil, body [to] expand, and other not pleasant things, we COULD argue that the sheer volume of air rushing past her slowed those effects" (Macdonald 2020a), thus we are walking a fine line in this case between the two truths.

One might think that this approach is uncontroversial under the circumstances. As it turns out, though, it does raise questions. To the extent that science consultants are able to usher accurate science into the production of a piece of science fiction, does that necessarily lead to successful public communication of science? Part of the issue is that it depends on what model of science communication one is assuming. If the concern is for accurate scientific facts and content to be reflected in the fictional representation—and the assumption is made that presenting such facts is sufficient for increasing the public's (that is, the audience's) scientific literacy—this tends to express the deficit model of science communication. The deficit model makes the possibly questionable assumption that audiences are able to judge the difference between accurate and inaccurate scientific content in fictional presentations. In addition to that, the publicized use of science consultants might lead to the conclusion that inaccurate fictional representations of science are not only plausible but accurate (Kirby 2003).

According to the most recent *Science & Engineering Indicators* report from the National Science Foundation, Americans correctly answered 5.6 out of nine factual knowledge questions about science and technology. Only three in ten had a clear understanding of what is meant by a *scientific study* (National Science Board 2018). This reinforces the current general state of scientific literacy among the public. How much of this is accounted for by consumption of science fiction media is unclear. The current *Indicators* report does not mention fictional media, although the 2000 version expressed concern over the challenge to the public's ability to distinguish fact from fiction due to the increasing availability of information (Barnett et al. 2006). What does seem clear, though, is the need to raise these questions. One might conclude that science consultants "contribute to the [film] industry's ability to confuse the public as to what is real and what isn't" (Frank 2003, 463).

All of this is not to say that fictional science should not at least be plausible and perceptually real. It is to suggest, how-

Science consulting in science fiction such as *Star Trek* would involve a process of finding something in or on the cutting edge of real science that will fit the dramatic needs of a story.

Roddenberry and the *Star Trek* cast on hand for the space shuttle *Enterprise*'s rollout on September 17, 1976.

ever, that there is more to the relationships among science fiction, science fact, and science communication than "accuracy" and the deficit model. It has been shown, after all, that "bad" science in fictional contexts can produce misunderstandings about how the world works. These misunderstandings can be built from the level of plausibility arising from a compromise between referential and perceptual reality. Based on a combination of some correct science and credibility seen coming from a character in a movie, viewers can take away misunderstandings when accepting the plausible yet incorrect science that is also part of the visual experience. In one study, Earth science students came away from watching the film *The Core* confidently believing the center of the Earth was liquid rather than solid and using content from the film to explain their belief (Barnett et al. 2006). Perhaps these misunderstandings are unavoidable—again, the tension between veritable truth and dramatic truth, between *Star Trek* and *Nova*. Perhaps there is some tidying up that communicators need to do after science consultants have done their best on behalf of realism on the production side of fictional works.

A compromise must be reached between the "veritable truth" as established by science and the "dramatic truth."

Rather than rely simply on facts and the deficit model of science communication, some science communicators are relying—either after the fact or as part of the production team or both—on science fiction's ability to inspire and fire the imagination. Science fiction has been credited with this ability when it comes to education and career choices, deeper thinking about ethics and science, more creative problem solving, and so on (Orthia 2019). Some science communicators, then, have taken on a "contextual" model of science communication by addressing the questions of science in science fiction for the benefit of fans, though not just for fans. The approach is to look at pieces of science fiction, sharing references and enthusiasm with the public in this version of the public communication of science, and analyze the material in terms of how the fictional portrayals of science compare and contrast with how nature actually operates.

Lawrence Krauss (1995) prefaces his *The Physics of* Star Trek, a pioneering work among a number of "real science of"–type projects (O'Keefe 2017, 27), by saying that he did not want to write about just what *Star Trek* got wrong. He was inspired by fictional technology (the transporter in his case) to consider how such technology might work and what the implications would be for a variety of topics ranging from biological complexity to particle physics. One must still make the distinction between the "good" science and "bad" science, but that is only the starting point. Some consider these "real science of" approaches an erosion of such distinctions to the detriment of an informed citizenry (O'Keefe 2017). However,

deficit approaches to science communication are giving way to those that take the backgrounds and experiences of different publics into account and can lead to a more collaborative use of a valued creative product in attempts to communicate and educate. "The initial notion of public understanding of science as a didactically conceived one-way street through which scientific literacy is diffused did not miraculously lead to increased public support for science" (Nowotny 2005, 1118), nor, apparently, to scientific literacy. The goal for these more recent communicators is to embrace the fictional media and the surrounding culture that such media inspires. Failing to do so by adhering strictly to real science and discounting the fictional science risks failing to inspire the target audience by failing to find value in the fictional source material (O'Keefe 2017).

Perhaps there is some tidying up that communicators need to do after science consultants have done their best on behalf of realism on the production side of fictional works.

This is more the approach demonstrated, for example, by science communicator Erin Macdonald. The recently named consultant for the *Star Trek* franchise and self-described tattooed gravity queen meets science fiction fans where they are (whether in the classroom or at science fiction conventions) and brings her PhD in astrophysics and specialization in gravity waves to bear on the science of science fiction (see her *Dr. Erin Explains the Universe* series on YouTube). In the terms we have been using so far, she addresses how well the perceptual reality squares with the referential. More important, perhaps, to the extent that the perceptual reality falls short, Macdonald addresses why that is and what it would take to actually achieve what we are seeing on the screen or reading on the page. Rather than feeding information to the public (as in the deficit model), Macdonald prefers to:

> provide an anchor for those people [by relating] the information to science fiction or popular culture. They can say, "I can picture that; I've thought about that." I also like that when you start bringing in science fiction to teach science, people start asking questions about different films and wondering, "Wait, would that *really* work?" That's a big part of why we teach science, to build those critical-thinking skills. (Baldwin 2019)

Wait, would the spinning ring that creates artificial gravity, say, really work like it does in *2001: A Space Odyssey*? Once more, it is not quite that easy. As Macdonald explains it:

> To get 1G of gravity, you would need a large ring rotating slowly or a small ring rotating quickly. A large ring is prohibitive just from a practicality standpoint, expensive to launch to space and hard to plan/build. A small ring rotating quickly has more of a biological issue—the centrifugal forces would be different from your head to your feet, because your height would be a significant portion of the radius of the ring. This would cause terrible vertigo any time you tried to move or walk around, particularly in directions opposite to that of rotation. (Macdonald 2020b)

The multiply connected universe allows for moving in all sorts of directions. Those who engage with science fiction and science fact can move together in all sorts of directions as the public communication of science continues to evolve. Collaboration and conversation around these "real science of science fiction" perspectives, which "demonstrate an authentic and responsible treatment of both the fictional and nonfictional content" (O'Keefe 2017, 31), can build upon the work of creators and consultants for a more robust public communication of science. ■

References

Baldwin, Melinda. 2019. Q&A: Astrophysicist Erin Macdonald on science and sci-fi. *Physics Today* (May 9). Available online at https://physicstoday.scitation.org/10.1063/PT.6.4.20190509a/full/.

Barnett, M., H. Wagner, A. Gatling, et al. 2006. The impact of science fiction film on student understanding of science. *Journal of Science Education and Technology* 15(2): 179–191.

Bodmer, Walter. 2011. Foreword. In *Successful Science Communication: Telling It Like It Is*, edited by David J. Bennett and Richard C. Jennings. Cambridge: Cambridge University Press.

Bormanis, Andre. 1998. *Star Trek: Science Logs.* New York: Pocket Books.

Frank, Scott. 2003. Reel reality: Science consultants in Hollywood. *Science as Culture* 12(4): 427–469.

Kirby, David A. 2003. Scientists on the set: Science consultants and the communication of science in visual fiction. *Public Understanding of Science* 12(3): 261–278.

Krauss, Lawrence. 1995. *The Physics of* Star Trek. New York: Basic Books.

Macdonald, Erin. 2020a. "And of course we get the classic airlock opening to vacuum of space." Twitter (January 16). Available online at https://twitter.com/drerinmac/status/1217957694755049473.

———. 2020b. Email to author (January 20).

National Science Board. 2018. Science & Engineering Indicators 2018. National Science Foundation. Available online at https://www.nsf.gov/statistics/2018/nsb20181/report/sections/science-and-technology-public-attitudes-and-understanding/highlights.

Nowotny, Helga. 2005. High- and low-cost realities for science and society. *Science* (May 20). Available online at https://pdfs.semanticscholar.org/27f9/2c22b282694d6a15cbdc273256ab082a6e9c.pdf?_ga=2.243449862.228794609.1578766913-17696096.1578766913.

O'Keefe, Moira. 2017. Riding the wave: Science fiction media fandom and informal science education. *Journal of Science Fiction* 1(3): 24–39.

Orthia, Lindy A. 2019. How does science fiction television shape fans' relationship to science? Results from a survey of 575 *Doctor Who* viewers. *Journal of Science Communication* 18(4). Available online at https://doi.org/10.22323/2.18040208.

Solow, Herbert F., and Robert H. Justman. 1996. *Inside* Star Trek*: The Real Story*. New York: Pocket Books.

Von Puttkamer, Jesco. 1980. The origin of *Star Trek*'s wormhole. *Starlog* (April): 25.

David R. Powell is an academic librarian and science fiction fan in Delaware, Ohio. He is also a member of the Guerrilla Skepticism on Wikipedia project.

Reopening the Chase Vault Mystery

A classic unexplained mystery of restless coffins in Barbados has baffled researchers for centuries. But an onsite investigation—combined with fresh folkloric analysis—may finally put the matter to rest.

BENJAMIN RADFORD

Of the countless "unexplained mysteries" I read as a teenager, one in particular stands out as especially spooky: the restless coffins in a burial vault in Barbados. It is a classic scary story, along the lines of King Tut's curse or the Devil's Footprints found in an English snowfall. These were to me interesting but dusty and distant—unlike a Bigfoot report in California or an alleged UFO crash in my home state, they all happened long ago in faraway places—and thus I never bothered to look into the mysteries.

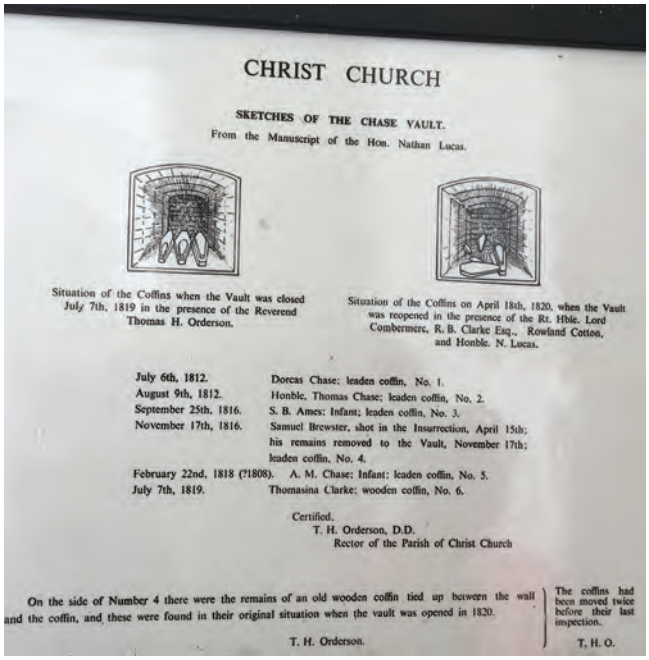
Nevertheless, I've since become more familiar with both investigation and folklore. Recently, I twice visited the Chase Vault, and in the process I discovered fresh angles on the otherwise stale story. I'd always assumed that the musty mystery—calcifying as it has for two centuries in the weltering Caribbean sun—would always remain unsolved. I no longer believe that to be the case.

The Chase Vault Story

There are several versions of the story (more on that later), but the basic one goes something like this, taken from *The History of Barbados* (1848), by Sir Robert Schomburgk:

> A strange occurrence took place in the adjacent churchyard, the natural cause of which has never been explained. On two occasions, when the death of a member of the family of the late Colonel Chase had rendered it necessary to open the family vault, it was found that the coffins had been removed from their places, and as no signs were observed that the vault had been opened without the knowledge of the family, it excited great astonishment. Before the vault was walled up again, the coffins were restored to their original position. Shortly afterwards it was requisite to open the vault again for the admission of a member of the family, when the coffins were found to have been displaced as on the former occasion; the family now became anxious to ascertain the truth, and particular pains were taken in securing the wall,

Figure 1. Entrance to the cursed Chase Vault at the Christ Church Parish cemetery in Barbados. Photo by the author.


CHRIST CHURCH

SKETCHES OF THE CHASE VAULT.

From the Manuscript of the Hon. Nathan Lucas.

Situation of the Coffins when the Vault was closed July 7th, 1819 in the presence of the Reverend Thomas H. Orderson.

Situation of the Coffins on April 18th, 1820, when the Vault was reopened in the presence of the Rt. Hble. Lord Combermere, R. B. Clarke Esq., Rowland Cotton, and Honble. N. Lucas.

July 6th, 1812. Dorcas Chase; leaden coffin, No. 1.
August 9th, 1812. Honble. Thomas Chase; leaden coffin, No. 2.
September 25th, 1816. S. B. Ames; Infant; leaden coffin, No. 3.
November 17th, 1816. Samuel Brewster, shot in the Insurrection, April 15th; his remains removed to the Vault, November 17th; leaden coffin, No. 4.
February 22nd, 1818 (?1808). A. M. Chase; Infant; leaden coffin, No. 5.
July 7th, 1819. Thomasina Clarke; wooden coffin, No. 6.

Certified,
T. H. Orderson, D.D.
Rector of the Parish of Christ Church

On the side of Number 4 there were the remains of an old wooden coffin tied up between the wall and the coffin, and these were found in their original situation when the vault was opened in 1820.
T. H. Orderson.

The coffins had been moved twice before their last inspection.
T. H. O.

Figure 2. Information posted at the entrance to the Christ Church Parish cemetery recounting a popular version of the Chase Vault legend. Photo by the author.

> and fine sand was thrown over the floor of the vault, so that, if a person should enter it from any other part than the usual entrance, marks might be left behind. [Then-governor] Lord Combermere was residing in 1820 in the neighbourhood of the church, and having been told of this mysterious circumstance, he made unexpectedly an application to the Rector to have the vault re-opened, when to the astonishment of all present, the coffins, to the number of five or six, were found scattered about, and one of the largest thrown on its side across the passage, so that, had the door not opened outwards, an entrance could not have been effected except by removing the slab on the top, which is of immense weight. The private marks made on the previous occasion were undisturbed, and as this was the fourth occurrence of a similar disturbance without the cause being explained, the family resolved on removing the bodies from the vault, and some of them were interred in the parish churchyard. The vault is now empty, and the Rector has since ordered it to be walled up. One of the gentlemen who accompanied Lord Combermere took a sketch of the position in which the coffins were found, copies of which are still extant in the island. (Schomburgk 1848)

The earliest published version of the story seems to date to an unsourced passage in the 1833 J. Alexander book *Transatlantic Sketches*. Consulting it and other sources, we can add a few more names, dates, and details to this outline: The vault at Christ Church Parish Church in Oisitins was originally built for another family, the Elliots, but was purchased in 1807 by Colonel Thomas Chase, who buried his infant daughter Mary there in February of the following year. In 1812, the vault was again opened to accept a second daughter, Dorcas (a rumored suicide), and the coffins were found in disarray. Col. Chase himself was interred there later that same year—dying, it is said, either by his own hand or killed by slaves. The vault was opened twice in 1816 and again in 1820 to receive Thomasina Clark, again with the unexplainable results. This last opening allegedly drew Lord Combermere to investigate—an event to which Nathan Lucas, a local chief justice, claimed to have been a firsthand eyewitness.

The story has many iterations, including accounts attributed to Lord Combermere, Lucas, Rev. Thomas Orderson, and others; versions written by Robert Reece, Sir Algernon Aspinall, K. Redding (author of an 1860 pamphlet titled *Death Deeds*), and others. I will spare readers a full accounting of them here, but fairly good overviews can be found in works by Andrew Lang (1907), Brian Ridout (2018), and Rupert T. Gould (1928).

There is no agreement on the order of interments, nor even how many coffins the vault eventually held. Details aside, the key conclusion is that the versions of the story are in many ways contradictory and at least some of the information fabricated. As Joe Nickell (1982) notes, "Although Lucas avows he was an eyewitness to the last opening, he is forced to rely on the Rev. Thomas H. Orderson's account of the earlier incidents and Orderson himself (if several 'authentic' accounts allegedly signed by him can be believed) never told the story quite the same way twice" (51). Lucas's original report—considered among the most reliable and detailed accounts of the events—has never been found (if it existed at all) and was merely *attributed to him* by an anonymous source.

Several drawings exist of how the coffins were supposedly found when the vault was opened, including on an informational plaque (see Figure 2). These add apparent veracity to the stories, but they could not have been drawn correctly for scale and other reasons; as Ridout notes, "None of the sketches can be reconciled with each other as to the position of the disturbed coffins at the final opening" (Ridout 2018, 53).

Despite the myth, misinformation, and missing information that plagues the Chase Vault story, many writers believe that it is substantially true: that at least some coffins did indeed move under unknown circumstances on at least a few occasions—regardless of whether or not any given account's particulars are correct. The question then is how.

Naturalistic Explanations

A variety of naturalistic explanations have been proposed over the centuries, many of them self-evidently flawed.

Vandals

The most obvious explanation is that unknown people entered the vault and disturbed the coffins. There would be no motivation, as the coffins were unopened and in any event there was nothing of value contained within. Furthermore, there was no evidence of any breach of the underground vault, no breaking of seals or traces on the ground. And all this would have been done under cover of night without artificial light to avoid detection—on multiple occasions over the course of eight years.

Earthquakes

Another explanation is an earthquake that somehow presumably affected only that vault. While earthquakes do occur in Barbados, they are rare, usually minor, and would likely have been noted as being linked to the (repeated) coffin disturbances.

Flooding

Another, somewhat more likely, natural explanation is that the vault became flooded and the coffins, despite being lead-lined and heavy, were nevertheless buoyant enough to have floated into such disarray and tumult. This theory was advanced in the 1860s, with its advocates noting that the Caribbean island is often battered by drenching hurricanes. Brian Dunning (2014) of the *Skeptoid* podcast, among others, did calculations to determine whether the coffins might conceivably float given their presumed mass and found it plausible.

The two possible sources would be storm water and ground water, though both are equally improbable. It's not obvious from photographs, but the vault and the Christ Church cemetery are near the top of a hill, and rain would run off in all directions long before filling a vault. Some water might naturally seep in through the ground and bricks during a heavy rainfall, but it would seep out soon thereafter because the earth there is mostly porous coral limestone that drains water quickly.

As for groundwater, Nickell quotes the Chief Engineer of the Waterworks Department of Barbados, who explains that "the top of the water table is at sea level. Consequently, the

higher the ground elevation, the greater would be the depth to the groundwater aquifer … . For flooding to be a real possibility, the vault would have to be no more than a few feet above sea level" (Nickell 1982, 55).[1] There is no reason to suspect that the location or construction of the Chase Vault is unique in any way—it is only one of many, both in Christ Church and around the island—yet there are no reports of floating coffins.

Gases

Some have suggested that gases escaping from the decomposing corpses would somehow cause the coffins to move. This is implausible for many reasons; as Nickell notes, "to suggest that several coffins would be repeatedly so moved to the extent … of standing one coffin on end is ludicrous" (Nickell 1982, 54). Also, of course, decomposition is inherent in the burial process and such disturbed coffins should be routinely seen.

Lightning

Some have suggested that lightning may somehow have moved the coffins. Barbados, like many Caribbean islands, is subject to frequent hurricanes sometimes accompanied by lightning strikes. Attempting to address the lack of plausible mechanism by which lightning would move the coffins, Brian Ridout recently advanced this theory in the *Journal of the Society for Psychical Research*. He states that the electric current created by a lightning strike could be responsible for the mystery:

> If the current reaches a lead coffin then it will induce a magnetic field, which will be a dipole … creating a positive and a negative end to the coffin. Because the coffins were all aligned the same way the induced charges at the head ends and at the feet ends would have been similar for each. The effect would only last for a fraction of a second because lead does not hold a magnetic field, but during that fraction of a second like charges will repel and unlike charges will attract. If the coffins were small or unstable then they would move as far as there was room to do so. (Ridout 2018)

Ridout acknowledges that there is no evidence that an electricity-conducting pole was anywhere near the Chase Vault in 1820 but suggests that the nearby church roof might have been hit.

To help evaluate this (very) speculative hypothesis, I gathered more information during my onsite visit. One important measurement missing from Ridout's calculations was how far the Chase Vault is from the (existing) foundation. From the nearest foundation corner to the vault is about forty feet (see Figure 3). I counted at least a dozen similar vaults on the west side of the church, where the Chase Vault is located, within about the same radius of the church, that would potentially have been just as affected by a lightning strike.

Spirits, Psychics, and Curses

Once naturalistic explanations have been dismissed, that of course leaves us with supernatural ones. In that event, anything from duppies (Caribbean ghosts) to curses to a miracle to telekinesis *could theoretically* have caused the tossed coffins, and there is exactly equal evidence for any of those. Sir Arthur Conan Doyle—creator of Sherlock Holmes and endorser of both fraudulent mediums and faked fairy photos—offered a memorable take on the Chase Vault story, asking, "What is one to make of such a story as this? The facts seem to be beyond question." Doyle posits a psychical explanation, one that evokes the Spiritualist assumptions of his era. He suggested that "animal magnetism" in the form of "negro effluvia" was responsible for the moving coffins.[2]

Figure 3. The Christ Church Parish church, with the Chase Vault in the foreground. Photo by the author.

Figure 4. Damage at the Christ Church Parish cemetery attributed to the Chase family curse. Photo by the author.

Where's the Beef?

Before attempting to explain something, we must first be sure there is something to explain. We need not puzzle over the particulars of how the coffins could have moved by themselves in the sealed vault if there's no real evidence they ever did. In this case, researchers have found absolutely nothing in contemporaneous church records, newspapers, or other sources suggesting anything unusual or mysterious happened at the Chase Vault at any time. Nickell notes that an 1842 book by Isaac Orderson—the rector's brother—about historical Barbados "contained not the slightest reference to the Barbados coffins mystery" (Nickell 1982, 56). Furthermore, according to Ridout, an 1866 record of the events, appearing in *Memoirs and Correspondence of Viscount Combermere*, "which should have been important, was written after Combermere's death by his wife … but there is no mention of the event" (Ridout 2018, 226). The complete lack of any reference to such a remarkable series of events *over the course of eight years* in any published records is perhaps as great a mystery as the moving coffins themselves.

Even advocates of the Chase Vault mystery admit that at least some of the story is embellished and wrong in various particulars. The error they make is not going far enough and not questioning the legitimacy of the entire legend. The issue is not that somewhere amid the confused and contradictory welter of demonstrable embellishments, rumors, and third-hand sources there's a genuine unsolved mystery involving restless coffins. The Chase Vault story does not merely *contain* legend; it *is itself* legend.

With nothing apparently unique about the physical vault, to understand the mystery we can adopt a folkloric approach and ask why that vault is said to have been cursed. Regardless of whether or not the Chase Vault coffins genuinely moved, why do people—and Barbadians in particular—*believe* they moved?

Investigating the Chase Vault

Firsthand field investigation of many mysteries can often yield unexpected clues. Visiting Barbados most recently in 2019, I interviewed amateur historian and tour guide C.J. Hines in Bridgetown as he drove us to the Christ Church cemetery to see the infamous vault. "It's a true story, and it's not the first time something like that has happened in Barbados," he said (Hines 2019). He rejected all the "scientific" explanations, averring that the legend was true—but that there's little mystery behind it.

Once naturalistic explanations have been dismissed, that of course leaves us with supernatural ones.

He explained to me that the vault's dead were disturbed because the Chase

> family fought in life, and they fought in death. And the only way to separate the fighting, in the end, was to put them in different parts of the church cemetery. And even then, they still found a way to cause destruction … . After they took them out of the vault [in 1820], and put them in different corners of the churchyard, they had an earthquake and it went straight across the church. No matter how many times they try to repair it, it goes back the same way. That part, a lot of people don't know. (Hines 2019)

As evidence, he later pointed out several places in the cemetery where vaults had broken and earth had sunken, attribut-

Figure 5. The author examining the Chase Vault interior. Photo by Shana Pedroncelli.

Figure 6. Interior original bricks in the Chase Vault, showing no discernible signs that any coffins hit or scraped them. Photo by the author.

ing them to the Chase family curse (see Figure 4).

Only the Chase family vault was affected, Hines explained, because "they were dabbling in black arts, and it went to the graves with them. They were fighting amongst themselves in life, over the land, over money, relations, it was always problems with that family, and they took it directly to the grave" (Hines 2019). This "in death as in life" folkloric theme of course holds a moral lesson: Get along with your family, don't quarrel with neighbors, and so on. Indeed, as folklorist Linden Lewis explained of Barbadian legends, "Folk tales … are born of the hopes and fears, anxieties, aspirations and frustrations of a people. They … become popular media for explaining and understanding the complex material conditions of existence of the populace. At the kernel of the folk tale there is a moral" (Lewis 1990, 86). I was reminded of another Caribbean ghost legend I'd investigated in nearby Jamaica, that of the White Witch of Rose Hall (see Radford 2010), a similar story of a cruel and quarrelsome family schooled in black magic that had come from elsewhere to wreak havoc.

We need not puzzle over the particulars of how the coffins could have moved by themselves in the sealed vault if there's no real evidence they ever did.

Because the Chase Vault is accessible and open to the public, it may yield physical clues to confirm or refute parts of the legend. Though the mysterious events happened some two centuries ago—assuming, of course, they occurred at all—the vault has by all accounts been preserved more or less as it was in the 1800s, with a few notable and easily identified exceptions. The interior bricks, for example, are original and would likely reveal physical evidence of such acts as heavy lead coffins being violently tossed about inside a small vault.

The interior walls and ceiling are lined with red bricks (with stone at the back), which are in excellent condition for their age (protected as they are from sun and rain) yet reveal no sign at all of any significant forces being applied to them. Given the tight quarters of the vault, to have the coffins repeatedly moved so dramatically (spun 90 or 180 degrees by some accounts), their six corners would surely have struck the bricks and left many marks. Yet an examination of the bricks (see Figure 6) reveals little if any damage other than some salt seepage and discoloration. There was little or no evidence that anything unusual happened at the vault, though my onsite research had helped refute various theories.

A Masonic Hoax?

Folklore, a third category of explanation for the Chase Vault story—neither a (real) natural event nor a (real) supernatural one—has been largely neglected in previous research. Nickell spent many months investigating the Chase Vault, assembling literary evidence that Freemasons were involved in the legend. Ridout writes:

> The difficulty in finding a natural cause has led to the suggestion that the derangement of coffins never happened and the likely perpetrators of the charade were Freemasons. We are informed (Nickell 1982) that the story is loaded with Masonic symbolism, but this must be viewed with caution. The structure was a "vault"; the burial chamber was "arched"; it was constructed from "masonry" bonded with "cement" and a search for unauthorised entry might reasonably include "sounding the walls and floor with a hammer." Symbols should not be confused with facts. (Ridout 2018)

Another writer, Christopher Saunders (2019), argues, "Such breathless dot-connecting fails to explain what purpose this trickery serves; Nickell's tale of an elaborate Masonic conspiracy to tell spooky stories wouldn't convince Dan Brown." Ridout acknowledges:

> It is probably true that some of the prominent people involved were Masons, but less certain that this would include the parish priest who had overseen the burials. Orderson's epitaph on his memorial stone recalls his fervent piety and it is difficult to imagine him conniving in the eviction of the Chase family so that their vault could be used for Masonic ritual. (Ridout 2018, 232)

These mischaracterize Nickell, who neither claimed nor suggested that Orderson or anyone else was "conniving in the eviction of the Chase family so that their vault could be used for Masonic ritual." Instead, Nickell merely claimed that "the Barbados vault story was fictitious" (Nickell 1982, 83) and "shaped into an allegory related to the 'secret vault' of Freemasonry" (Nickell 1982, 86); there's no hint of any conspiracy to use the vault for any ritual, Masonic or otherwise. The fact that an early version of the Chase Vault story is arguably infused with Masonic allegory signifies nothing more than that whoever recorded that particular version was familiar with Freemasonry and added those elements to a preexisting legend while retelling it.

Restless Coffin Legends

To understand the mystery, it's important to recognize that the Chase Vault story is only one of several legends—perhaps a half-dozen or more—involving moving coffins in supposedly sealed vaults around the world.

Folklorist Andrew Lang recounts an identical tale regarding a Lutheran cemetery in Ahrensburg, in the island of Oesel, in the Baltic Sea. It seems that in June 1844, a burial vault of the Buxhoewden family "became noisy" and spooked horses (this detail later appeared in versions of the Chase Vault legend). When the vault was examined to investigate the noise, the coffins within were discovered to be "lying in a confused pile." It happened several times, yet there was never a sign of robbery or entry, even when wood ashes were scattered upon the floor to reveal intruders (recalling the fine sand used in the Chase Vault). On the final occasion, "the coffins were standing on their heads. The lid of one was open and the hand, *that*

of a suicide, protruded" (Lang 1907, 378; emphasis in original). The unruly (un)dead were finally quieted when removed from the vault and buried separately in earth. Lang adds that despite considerable investigation, no evidence of such happenings were ever discovered and that the "disturbances precisely parallel" those described at the Chase Vault.[3] Lang describes another case in Suffolk, England, as well, referenced by a Sir James Clerke in 1833. Predictably, despite the story being told as true, no verifiable information can be found.

When my Bajan guide C.J. Hines casually mentioned to me that the Christ Church Parish cemetery was not the only place in Barbados where coffins moved, I was intrigued. He had no specific information about where it was off the top of his head, but he assured me there was at least one other identical mystery on the island.

In fact, we need not visit the British Isles or the Baltic Sea to find these tales; though the Chase Vault is the most famous mystery on the island, the Christ Church cemetery was not the only place coffins were said to move in Barbados. Indeed, the same thing is said to have happened only about seven miles to the north, in the parish of St. Thomas. Consulting previous articles and book chapters on the Chase Vault mystery, I found little or no mention of the parallel legend; it seemed to have been largely overlooked, though in his 1928 book *Barbados Diocesan History*, Cannon Reece briefly references an intriguing report noting that "*A rather common feature among Barbados legends* is the erratic behaviour in vaults of lead and copper coffins. There is of course the famous Christ Church story [as well as] *three or four other stories*" (emphasis added; quoted in Ridout 2018).

Even a solitary story of such a seemingly singular event would be curious, but four or five such stories about restless coffins on such a small island is remarkable indeed. The specifics of all of them do not seem to have been recorded, though one is known. I eventually found a reference to the story: the book *The World's Creepiest Places* notes that the Chase Vault story "parallels another tale concerning the Williams family vault, also on the island of Barbados" (Curran 2012). It concerns a Welshman named William Asygell Williams who moved to the island in the 1600s. The cause of the trouble, as is often the case, was religion. A son in the proudly Protestant Williams family fell in love with and married a Catholic girl, raising their children as Catholics, much to his family's fury.

> When the General's daughter-in-law died at the beginning of the 1700s, she was laid to rest in the family vault. Some years after, when the vault was opened again, it was found that a number of the coffins had moved, apparently of their own volition. The supposition was that the Protestant dead had taken exception to the Catholic interment and had moved their coffins away from hers. This story was well known across Barbados and may have influenced the tale of the Chase Vault. (Curran 2012, 34)

A few other brief versions of the tale found online describe repeated disturbances throughout various burials at that vault.

I found independent corroboration of this in the book *Genealogies of Barbados Families: From* Caribbeana *and* The Journal of the Barbados Museum and Historical Society, which mentions "the family vault built by General William Asygell Williams. … Through the ensuing years this vault has been the subject of popular legend and many a family anecdote" (Brandow 1983, 593). Records date the vault to at least January 9, 1741, demonstrating that the Williams Vault preceded the Chase Vault by at least sixty years.

That is of course a hallmark of folklore; legends are regionally adapted and incorporate local people, locations, and events into the stories, adding believability and relevance. The Williams vault legend easily could have migrated a few kilometers across the small island, moving from one quarrelsome, wealthy, slaveholding European colonist family to another, with Masonic references added along the way when the story was attributed to the Chases in Christ Church Parish.[4] As Lang notes, "the tendency to revive and renovate old stories by giving them a contemporary date and a familiar locality is now perfectly well understood" (Lang 1907, 376).

Even advocates of the Chase Vault mystery admit that at least some of the story is embellished and wrong in various particulars.

Despite voluminous claims to the contrary—and Conan Doyle's assumption that "the facts are beyond question"—the centuries-old mystery of the Chase Vault is neither true nor a hoax; it is instead precisely what it appears to be: a legend. There's no evidence that anyone (Freemason or otherwise) intentionally created or hoaxed the story; instead they did what all humans do when they hear a good story: they retold the "true story" and changed it in the process, emphasizing and adding elements according to their beliefs and agendas. The Chase Vault story is not a Masonic legend; rather it is one version of a broader moving coffin legend that happens to have been imbued with Freemason allegory. It's served its purpose for over a century, providing fodder for mystery lovers while reminding Bajans to be kind to each other. ■

Acknowledgements

I thank Tim Binga, Celestia Ward, and Shana Pedroncelli for their research help in digging into the Chase Vault story.

Notes

1. Several writers have offered incorrect information about the elevation of the Chase Vault. Ridout (2018) claims that "the vault is on a prominence about 100 feet above sea level," while Dunning (2014) puts it at thirty-three meters, or 108 feet; Nickell (1982) offers an estimate of "some 250 feet," which is closer; the entrance is at about 210 feet above sea level as measured by iPhone GPS.

2. Doyle states that "all psychic phenomena seem to show that the disembodied have no power of their own, but that it is always derived from the emanations of the living, which we call animal magnetism or other names. … If the walls of cloth of a [spirit medium's] cabinet can contain these emanations and condense them, how much more the solid walls of this vault. To bring in these weighty leaden coffins the space must have been

crowded with over-heated negroes, and when the slab was at once hermetically sealed, these effluvia were enclosed and remained behind, furnishing a possible source of that material power which is needed for material effects" (quoted in Doyle 2011).

3. The theme of suicide as indicator of a "bad death" likely to create a ghostly presence is notable. Suicides were taboo in most communities, and those who died by their own hand were often refused burial in the hallowed church ground. The Buxhoewden vault story contains a specific reference to a suicide, and Lang notes that "Reece (1864) says that the negroes in Barbados attributed the troubles to a suicide" (Lang 1907, 385) and notes that Colonel Chase was said to have killed himself, perhaps—according to locals—bringing his posthumous troubles to the cemetery. Indeed, Lang says, "It will be observed that the Oelsen and the Barbados tales are precisely similar in every respect, including the supposed cause of trouble, the presence of the corpse of a suicide" (Lang 1907, 386).

4. Whether the Masonic allegories Nickell finds throughout the Chase Vault story also appear in the Williams Vault story would be an interesting matter to investigate; it seems just as likely that the Williams legend (or another like it) was heard in Christ Church and became attributed to the Chase family by people who happened to be Masons.

References

Brandow, James (Ed). 1983. *Genealogies of Barbados Families: From* Caribbeana *and* The Journal of the Barbados Museum and Historical Society. Baltimore, Maryland: Clearfield Company.

Curran, Bob. 2012. *The World's Creepiest Places.* Pompton Plains, New Jersey: The Career Press.

Doyle, Arthur Conan. 2011. *Delphi Complete Works of Sir Arthur Conan Doyle.* London: Delphi Classics.

Dunning, Brian. 2014. The moving coffins of Barbados. *Skeptoid* (January 28). Available online at https://skeptoid.com/episodes/4399.

Gould, Rupert T. 1928. *Oddities: A Book of Unexplained Facts*. London: Geoffrey Bles. (Reprinted 1966).

Hines, C.J. 2019. Interview by the author in Bridgetown, Barbados (March 31).

Lang, A. 1907. 'Death's deeds': A bi-located story. *Folk-Lore* 18(4) (December 31). Transactions of the Folklore Society.

Lewis, Linden. 1990. Exploring the folk culture of Barbados through the medium of the folk tale. *Caribbean Studies* 23(3/4): 85–94.

Nickell, Joe. 1982. Barbados' restless coffins laid to rest. *Fate.* Part I, 35(4) (April): 50–56; Part II, 35(5) (May): 79–86.

Radford, Benjamin. 2010. The White Witch of Rose Hall. In *Scientific Paranormal Investigation: How to Solve Unexplained Mysteries.* Corrales, New Mexico: Rhombus Publishing Co.

Ridout, Brian. 2018. Research note: An analytical review of the Chase Vault mystery at Christ Church, Barbados. *Journal of the Society for Psychical Research* 82(4): 219–239.

Saunders, Christopher. 2019. Things that are not: The case of the dancing coffins. *The Avocado* (March 9). Available online at https://the-avocado.org/2019/03/09/things-that-are-not-the-case-of-the-dancing-coffins.

Schomburgk, Robert. 1848. *The History of Barbados, Comprising a Geographical and Statistical Description of the Island; a Sketch of the Historical Developments Since the Settlement; and an Account of its Geology and Natural Productions.* London: Longman, Brown, Green, and Longmans.

Benjamin Radford is a research fellow for the Committee for Skeptical Inquiry and deputy editor of the Skeptical Inquirer. His many books include *Scientific Paranormal Investigation*, *Investigating Ghosts*, *Bad Clowns*, *Mysterious New Mexico*, *Tracking the Chupacabra*, and *Hoaxes, Myths, and Manias* (with Robert Bartholomew).

Skeptical Inquirer
The Magazine for Science and Reason

Skeptical Inquirer is now available for digital-only subscription.

Our digital subscribers can read the full contents of each new issue and have total access to Skeptical Inquirer's entire online archive, dating back to 1976, all without receiving physical magazines by mail.

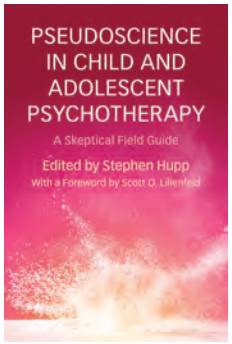
Current print subscribers also have full digital access to our online articles and archives. Print subscribers can access the digital content by visiting skepticalinquirer.org, clicking "Activate" in the top-right corner of your screen, and then filling out the corresponding form. Our digital content is viewable on desktop, laptop, tablet, or smartphone.

Consider giving a gift subscription to a young person you know who might appreciate Skeptical Inquirer's content but prefers to read on a digital device—or to a friend overseas.

skepticalinquirer.org

Dubious Claims in Psychotherapy for Youth

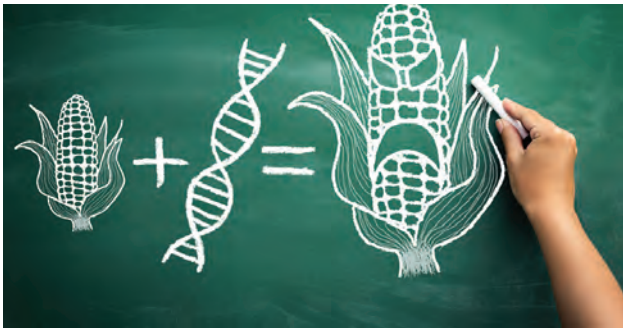
Part III: Externalizing Issues and Daily Routines



This is the final article in a three-part series about questionable ideas in child and adolescent psychotherapy. Topics in this installment relate to externalizing issues and daily routines and include feeding children GMOs (genetically modified organisms), breatharians, self-acupressure for constipation, alien abductions during sleep, lying, and specialized goggles to prevent impaired driving.

STEPHEN HUPP, NATALIE NEWELL, JOE NICKELL, HARRIET HALL, W. BLAKE SMITH, ROBERT S. FELDMAN, MIRANDA MEEKER, AND LEANNA KEHL[1]

This is the third and final installment of a three-part series that shares the sidebars from the book *Pseudoscience in Child and Adolescent Psychotherapy* (edited by Stephen Hupp, Cambridge University Press, 2019). Contributors for this installment include a film director, a paranormal investigator, a family physician, a podcast producer, a social psychologist, and two graduate students in a clinical child psychology program. Topics covered include symptoms related to feeding, eating, toileting, sleep, behavior problems, and substance use.



Feeding: Should Parents Avoid Feeding Their Children GMOs?

Natalie Newell

When people refer to "GMOs," they are usually referring to crops that are developed with genetic engineering (i.e., genetically modified organisms), which is a more precise type of plant breeding (GMO Answers N.d.). Of course, most of our food has been modified over time through various breeding methods, but some parents may be hesitant to feed their children GMOs because of the "frankenfood" myths attached to genetic engineering. However, as Kavin Senapathy notes in the *Science Moms* documentary, "You can ask the question, 'How many people have gotten sick, died, gotten cancer, even gotten a cold or a cough as the result of eating GMOs?' And the answer is zero. There hasn't even been a sniffle associated with consuming an ingredient or product derived from a GMO" (Newell 2017). The body of evidence gathered from studying genetically modified crops since their introduction three decades ago shows that genetically modified products pose no greater health risk than their conventionally bred counterparts (Nicolia et al. 2014). Most food experts suggest that parents focus on encouraging their children to develop a healthy relationship with food, without spending unnecessary time and energy

Some parents may be hesitant to feed their children GMOs because of the "frankenfood" myths attached to genetic engineering.

worrying about how the ingredients were bred.

Eating: Is It Possible for Breatharians to Live without Food or Water?

Joe Nickell

Some mystics claim to practice inedia—that is, to suspend all eating and, sometimes, even drinking. But are inedics genuine, or do they deceive—either themselves or others? In 1980, a cult founded by Wiley Brooks raised just such questions; he espoused not only giving up eating meat but eventually living off nothing but light and air!

Since ancient times, extreme fasting has taken a variety of cultural forms. For example, there were visionaries who (like Jesus in Matthew 4:1–11) went into the wilderness to fast, hoping to thereby experience holy revelations. And in the early Christian era, mostly male hermits subsisted on bread and water to contemplate the world's end.

During the thirteenth and fourteenth centuries, a religious fasting fad attracted women such as the future Saint Catherine of Sienna (1347–1380). She imagined demonic torture, exhibited the stigmata, and experienced visions—which the author of *Holy Anorexia* attributed to "an eating/vomiting pattern typical of acute anorexia." Being vainglorious, he says, Catherine "starved herself to death." A very late example of this type was Therese Neumann (1898–1962), whom

Since ancient times, extreme fasting has taken a variety of cultural forms.

suspicious church authorities monitored. Tests of her urine revealed that after fasting she had, secretly, resumed intake of food and drink. (For more on this, see Nickell [2017].)

The nineteenth century tended to see inedics more as prodigies than holy persons and included sideshow artists styled as "Living Skeletons." Finally, first described scientifically in 1868, came those recognized as having anorexia, whose refusal of food stems from emotional conflict.

As to Wiley Brooks—who espoused reverting from carnivorism to vegetarianism, then fruitarianism, liquidarianism, and finally to breatharianism—his followers' faith was badly shaken when Brooks was discovered making nighttime forays to buy junk food.

Toileting: Does Self-Acupressure Work for Constipation?

Harriet Hall

Constipation is a common complaint, affecting between 1 and 30 percent of children. It can sometimes be due to underlying diseases; however, it is usually "functional,"

meaning the child is healthy but has difficulty defecating. Sometimes the stool is hard and difficult to pass, and sometimes a child is simply unwilling to defecate because of a previous painful bowel movement or other psychological factors. Functional constipation is usually treated with dietary changes, laxatives, and behavioral modification.

A less conventional treatment is perineal acupressure, where the area between the scrotum or vagina and the anus is massaged. A randomized, controlled study in adults in 2014 (Abbott et al. 2015) found that self-acupressure was effective for constipation, improving both bowel function and quality of life. Applying finger pressure to the perineum in intermittent pulses is supposed to break up the hard stool in the rectum, making it easier to pass. For females, using a finger in the vagina would probably work even better but might not be as readily accepted. This is essentially a noninvasive method of disimpaction that has nothing to do with acupressure.

It purportedly uses the Ren 1 acupoint, an imaginary point on the perineum that is said to nourish Kidney Yin and resolve Damp-Heat. Sticking needles in that spot is used in traditional acupuncture to treat everything from constipation and hemorrhoids to loss of consciousness, asphyxiation from drowning, and manic psychosis! Acupressure is a variant of acupuncture, a prescientific treatment system based on myths. Acupuncture has been extensively studied and found

Sticking needles in that spot is used in traditional acupuncture to treat everything from constipation and hemorrhoids to manic psychosis!

to be a theatrical placebo (Colquhoun and Novella 2013).

So perineal "acupressure" stripped of the Oriental mumbo-jumbo is simply perineal massage, or perhaps it would be better to call it transperineal fecal disimpaction. The study has not been replicated, and the treatment has not been studied in children. Might it help? Possibly, because we know manual disimpaction (using a gloved finger in the rectum to break up the stool and scoop it out) is effective. But what if there is no hard stool in the rectum? For adults, I don't see any real downside to trying self-acupressure/perineal massage; it's unlikely to cause any harm. For small children, it

would be harder to justify. Having an adult massage a child's perineum for constipation has not been studied. Due to the connotations of touching that area, I can't help but wonder whether it might be associated in some minds with suspicions of sexual abuse. For more on this topic, see Hall (2014).

Sleep: Do Aliens Abduct People While They Are Sleeping?

W. Blake Smith

Since the alleged alien abduction case of Betty and Barney Hill in September of 1961, stories of people being abducted by aliens have become quite popular and have developed some very specific patterns. These stories often involve frightening accounts of people waking to find they are paralyzed and surrounded by entities they perceive as extraterrestrials. Movies such as *Close Encounters of the Third Kind* and books such as Whitley Strieber's *Communion* have provided a template for what these alleged alien abductions look like.

The good news is that there is no credible evidence that anyone is actually being taken by aliens to be experimented on. But that doesn't mean the people reporting it are lying. Several interesting psychological effects may be going on in these cases. First, for the sincere experiencer, the sensation of being paralyzed and sensing creatures, monsters, or evil intelligences is quite common and can be explained by a sleep condition called "sleep paralysis" (Blackmore 1998). When you have normal sleep, your body becomes paralyzed during your dream state, which is helpful to prevent you from acting out your dreams. But in sleep paralysis, something gets out of synch. Your mind wakes up, yet your body is still paralyzed. People often report a heavy pressure on their chest and the inability to move—but it usually passes fairly quickly. It is a frightening experience, but it is not dangerous, supernatural, paranormal, or extraterrestrial (Sagan 1996).

The other effect going on in many alien abduction stories happens when therapists hypnotize victims and try to help them "recover" their memories. Such recovered memories are extremely unreliable, and it is possible that the hypnotist may be actually helping create *false memories*. Investigations have shown that the people performing these memory recovery sessions are likely helping to create or enhance the victim's memory with untrustworthy narratives that fit their interest in alien abductions (Clancy 2005).

Modern physics and astronomy suggest that it is extremely unlikely that any aliens are actually visiting Earth and conducting experiments, but for the sufferer of sleep paralysis or the victim of false memories, it could be very difficult to shake the belief that something very unusual has happened.

Disruptive Behavior and Conduct: Is Lying Always a Sign of Psychological Problems?

Robert S. Feldman

American society certainly seeks to promote honesty. Consider national icons such as George Washington, who is recalled as never telling a lie, or Abe Lincoln, whose nickname is Honest Abe. More recently, consider the negative reaction to modern day presidents when they get caught lying. Our concerns about the act of lying go even further: persistent lying is seen as symptomatic of a considerable number of psychological disorders, including oppositional defiant disorder (i.e., falsely blaming others) and conduct disorder (i.e., lies for own benefit).

Yet if we look at decades of psychological research, the realities about lying and deception are quite different. In fact, lying is not only ubiquitous, but studies suggest that lying is actually a social skill that promotes effective interaction with others. Consider evidence from a study that I conducted with children and early adolescents. In it, my colleagues and

The good news is that there is no credible evidence that anyone is actually being taken by aliens to be experimented on.

I found that as children grew into adolescents, they became more effective liars—that is, it was harder to detect deception in children as they got older, a finding that has been confirmed by a considerable body of research. But what was particularly intriguing was that the greater the deception skills of adolescents, the better were their social skills, as judged by their teachers and parents. In other words, the most socially skilled adolescents were also the ones who were the most effective liars (Feldman 2010; Lavoie et al. 2017; Talwar and Lee 2008).

Although one extreme interpretation of this finding is that lying somehow makes you popular, that seems unlikely. More probable is that socially competent adolescents may understand better the value of providing supportive but not necessarily accurate information ("you did a great job on that class presentation"), or they know when to withhold information that is unwelcome to others, potentially because it is hurtful ("you seem to be putting on weight").

Coupled with findings that lying is frequent in everyday life (on average, lies occur at a rate of around three lies in ten minutes during interactions between those who are meeting for the first time; Feldman et al. 2002), these results suggest that lies per se are not a good indicant of psychological dis-

order. Indeed, one could argue the opposite: that lying, at least in moderation, is a sign of psychological health.

Substance Use: Are Specialized Goggles Effective at Preventing Impaired Driving?

Miranda Meeker and LeAnna Kehl

Specialized goggles are used in demonstrations in schools and on college campuses in the United States and internationally to simulate feelings of intoxication among their users. The goggles sufficiently impair a user's ability to see by altering his or her perceptual field. The individuals chosen to wear the goggles are often asked to participate in a variety of sobriety tasks, sports, games, or simulated driving (Innocorp, ltd. N.d.a). The goggles tend to create a feeling of being unbalanced, making these tasks difficult. In addition to the various tasks, students often watch testimonials from the families of victims of impaired driving accidents.

Although this tool was used before any well-designed research had been conducted to study its effectiveness, the company selling the product claimed that this tool was an evidence-based educational product that could be used to teach the potential consequences of misusing and abusing alcohol (Innocorp, ltd. N.d.b). These goggles are often used as a preventative measure to demonstrate the impaired ability to drive. Although many people believe that these goggles are an effective preventative tool, there are no studies that provide sufficient evidence that this tool actually reduces impaired driving.

One randomized controlled study provided evidence that individuals wearing the goggles did initially become less accepting of impaired driving immediately after using the goggles when compared to the control group. Yet the individuals watching the demonstration did not report a significant change in their attitudes toward impaired driving when compared to the control group (Jewell et al. 2004). In addition, when attitude changes were examined four weeks after the demonstration, this change was not upheld (Jewell and Hupp 2005). Also, when students were asked about their self-reported behavior rather than their attitudes alone, the individuals in the goggles group did not report engaging in risky driving behavior less than the control group. Overall, there is very little evidence indicating that specialized goggles are effective at preventing impaired driving. ■

Note

1. The authors are listed in the order that their work appears in the book. Authors were only involved in their own sidebar and were not involved in writing or editing the other sidebars.

References

Abbott, R., I. Ayres, E. Hui, et al. 2015. Effect of perineal self-acupressure on constipation: A randomized controlled trial. *Journal of General Internal Medicine* 30(4): 434–439.

Blackmore, S. 1998. Abduction by aliens or sleep paralysis? Skeptical Inquirer 22(3): 23–28.

Clancy, S.A. 2005. *Abducted: How People Come to Believe They Were Kidnapped by Aliens.* Cambridge, MA: Harvard University Press.

Colquhoun, D., and S.P. Novella. 2013. Acupuncture is theatrical placebo. *Anesthesia & Analgesia* 116(6): 1360–1363.

Feldman, R.S. 2010. *The Liar in Your Life: The Way to Truthful Relationships*. New York: Twelve/Hachette.

Feldman, R.S., J.A. Forrest, and B.H. Happ. 2002. Self-presentation and verbal deception: Do self-presenters lie more? *Basic and Applied Social Psychology* 24(2): 163–170.

GMO Answers. N.d. What is a GMO? Available online at https://gmoanswers.com.

Hall, H. 2014. Study of "acupressure" for constipation. Available online at https://sciencebasedmedicine.org.

Innocorp, Ltd. N.d.a Fatal Vision®Roadster – Pedal Kart (only). Available online at https://fatalvision.com.

———. N.d.b. Fatal Vision® Community Event Pack. Available online at https://fatalvision.com.

Jewell, J., and S.D. Hupp. 2005. Examining the effects of fatal vision goggles on changing attitudes and behaviors related to drinking and driving. *Journal of Primary Prevention* 26(6): 553–565.

Jewell, J., S. Hupp, and G. Luttrell. 2004. The effectiveness of fatal vision goggles: Disentangling experiential versus onlooker effects. *Journal of Alcohol and Drug Education* 48(3): 63–84.

Lavoie, J., S. Yachison, A. Crossman, et al. 2017. Polite, instrumental, and dual liars: Relation to children's developing social skills and cognitive ability. *International Journal of Behavioral Development* 41(2): 257–264.

Newell, N. (director and producer). 2017. *Science Moms* (documentary). United States: Independently produced.

Nickell, J. 2017. Mystery of Mollie Fancher, the 'fasting girl,' and others who lived without eating. Skeptical Inquirer 41(6): 18–21.

Nicolia, A., A. Manzo, F. Veronesi, et al. 2014. An overview of the last 10 years of genetically engineered crop safety research. *Critical Reviews in Biotechnology* 34(1): 77–88.

Sagan, C. 1996. *The Demon Haunted World: Science as a Candle in the Dark*. New York: Random House.

Talwar, V., and K. Lee. 2008. Little liars: Origins of verbal deception in children. In S. Itakura, K. Fujita, S. Itakura, et al. (eds.). *Origins of the Social Mind: Evolutionary and Developmental Views*. New York: Springer, 157–178.

Authors

Stephen Hupp, PhD, is a psychology professor at Southern Illinois University Edwardsville. He is the coauthor of the books *Great Myths of Child Development*, *Great Myths of Adolescence*, and *Thinking Critically about Child Development*, 4th Edition. He also currently holds the Guinness World Record for the "longest line of books." You can find him on Twitter @StephenHupp.

Robert S. Feldman, PhD, is the senior advisor to the chancellor and professor of psychological and brain sciences at the University of Massachusetts Amherst. He is author of several developmental textbooks and the book *The Liar in Your Life: The Way to Truthful Relationships* (2010).

Harriet Hall, MD, is a retired family physician, coeditor of the *Science Based Medicine* blog, and coauthor of the book *Women Aren't Supposed to Fly: The Memoirs of a Female Flight Surgeon* (2008). Her website is www.skepdoc.info.

Miranda Meeker, BS, and LeAnna Kehl, BA, are both graduate students in the Clinical Child and School Psychology master's program at Southern Illinois University Edwardsville.

Natalie Newell, MEd, is the director and producer of the *Science Moms* documentary (now available for free on YouTube). She is also cohost of the *Parenthetical (Science)* podcast. On Twitter she is @ncnewell.

Joe Nickell, PhD, is a paranormal investigator and senior research fellow for the Committee for Skeptical Inquiry (CSI). Among many other books, he is author of *The Science of Ghosts* (2012).

W. Blake Smith is the producer and cohost of *MonsterTalk*, a science show about monsters and official podcast of *Skeptic* magazine. On Twitter he is @DoctorAtlantis.

National Geographic's Name Used to Sell the Supernatural

Joe Nickell

Science of the Supernatural: Dare to Discover the Truth. Daniel S. Levy. National Geographic Partners. 2019. ISBN 978-5478-4942-0. 97 pp. Book-azine, $14.99.

The good name of the National Geographic Society (NGS) is unfortunately being misused, as Skeptical Inquirer has reluctantly noted on recent occasions. As discussed in our special issue "Health Wars" (September/October 2019), NGS has published in the past decade at least six newsstand books or "book-azines" on medicinal herbs and natural healing remedies that fail to meet scientific standards. And in "Whither National Geographic?" (January/February 2020), Editor Kendrick Frazier suggests that while *National Geographic* magazine still seems to exhibit high editorial standards, the company's book division might not.

Now comes another such NGS publication, *Science of the Supernatural: Dare to Discover the Truth*, by Daniel S. Levy (2019). This time, there is an effort to give the proverbial "both sides" of controversial topics such as psychic phenomena and witchcraft. Of course, showing two sides *where only one is scientific* is not the way to "discover the truth," as we soon see.

The book divides into four sections, with chapter one treating "Faith, Magic & the Miraculous." This includes such a wide variety of topics that it lumps Uri Geller's pretend psychic powers with "miraculous" healings, astrology, and several other topics. However, while it sometimes attempts to offer some science-based arguments for them, it often also tries to balance those with some speculative fantasy, revealingly referring to "this era of cold science and rational technology."

Showing two sides where only one is scientific is not the way to "discover the truth," as we soon see.

In discussing supposedly miraculous healings, for example, Levy considers the healing spring water shrine at Lourdes in France. There in 1858, the Virgin Mary appeared to fourteen-year-old Bernadette Soubirous, and ever since the Catholic Church has certified alleged cures there. Citing the latest one, that of a nun who visited Lourdes, Levy reports how, later in her room, she took off her leg braces and "could immediately walk." He does cite the placebo effect, whereby people believe some treatment is beneficiary and thereby "their mind directs their body to repair itself." But readers are left wondering at the immediacy of the cure. Doctors reportedly *could not explain* what happened, and so the Church certified another "miracle."

Readers must understand that *miracle* is not a scientific term. Its definition as that which cannot be explained by science relies on the logical fallacy of "an argument from ignorance"; one cannot conclude that because the cause is unknown, the effect must have been supernatural. Readers should also be told that important information has been with-

held: the nun actually *could* walk, just in a limited capacity. We may suspect that her body had, over time, already effectively healed itself, and that came to be discovered. Other "cures" may be attributable to misdiagnosis, psychosomatic conditions, prior medical treatment, and other effects, including (in the case of certain illnesses such as multiple sclerosis) spontaneous remission. As to the Lourdes visionary, St. Bernadette herself, she is a study in irony; the supposedly curative power of Lourdes escaped *her*: she was bedridden for the last years of her life and died young at thirty-five.

Doctors reportedly could not explain what happened, and so the Church certified another "miracle."

Again, in discussing the alleged "Sixth Sense," Levy commendably introduces James Randi, "a founding member of the Committee for Skeptical Inquiry," whose million-dollar challenge to psychic claimants went forever unclaimed. But then we are presented with a CIA Project Stargate test of Uri Geller who seems impossibly to have triumphed!

Alas, the author does not reveal that the tests were done by the notoriously credulous parapsychologists at Stanford Research Institute where mentalist Geller was allowed great laxity of controls, and his assistant was permitted to be, as Randi himself tells us, "constantly underfoot"! Without alerting readers to the revealing account from Randi's classic book *The Truth about Uri Geller* (1982, 30–54), Levy's selective reporting misleads the casual reader.

For some topics, the provide-both-sides rule is suspended, with astrology, charms, and other superstitions essentially given a free pass. Yet while chapter two, "The World of Witchcraft," rails against the inquisitors who tortured suspected witches, Levy can't help but offer the view that "Today witchcraft has evolved into an open set of beliefs involving goddess worship and honoring nature."

Be that as it may, chapter three presents new problems, because it lumps together "Vampires, Ghosts & More," under the heading "The Undead." The first problem is a two-page spread picturing an alleged "Vampire-Killing Kit" from 1840. However, these kits are notorious fakes—improvised from period boxes with partitions added for the assembled accouterments plus fake labels (as I show in my book *Tracking the Man-Beasts*, 2011, 125–129). Even the *idea* of such kits awaited Bram Stoker's *Dracula* of 1897.

Although Levy treats vampires skeptically, blaming the myth on diseases such as porphyria and "consumption," he leads with a case that begs for explanation—especially because it "helped spark a vampire craze throughout Germany, France, and England." That is the 1725 case of one Peter Plogojowitz, who clearly appeared on nights after his death, provoking his fellow Serbian villagers to exhume, stake, and burn his body, which showed signs of apparent vampirism. His seemingly paranormal appearances to others were almost certainly due to their experiencing the phenomenon of "waking dreams," realistic hallucinations that occur in the state between wakefulness and sleep. A plague, rumor, and vampire belief did the rest (see my *Entities* [1995], 236).

In the segment on "Ghosts and Poltergeists," author Levy continues the presenting-both-sides approach. Of ghosts, he acknowledges at the outset "there is no real scientific evidence of their existence," and he even follows up by mentioning how "settling houses" can "simply mimic the sound of otherworldly footsteps." Still, he gives a plug to the "paranormal tours" at the Stanley Hotel in the Rocky Mountains that inspired Stephen King's 1977 horror novel *The Shining*, as well as to the "ghost tours" of the R.M.S. *Queen Mary* (docked at Long Beach, California), where one might see among the plentiful spirits the resident "lady in white." Unfortunately, missing elements include explanations for apparitions, ghostly photographs, or the true nature of most poltergeist phenomena.

Finally, with chapter four's "Signs of the Otherworldly" comes the question of extraterrestrial life. Here, breezily mixed together, are the Roswell crash, Project Blue Book's UFO study, alien

Unfortunately, missing elements include explanations for apparitions, ghostly photographs, or the true nature of most poltergeist phenomena.

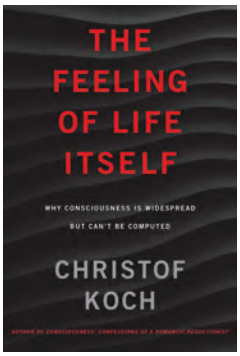
abductees, SETI, cinematic offerings such as *E.T.*, Peru's Nazca lines, and more. Once again, information is given in hit-and-miss fashion—as in opportunities missed to enlighten readers. Omitted is any evidence of hoaxing regarding the McMinnville, Oregon, UFO photos (one of which is shown); ditto the picture of an English crop circle, the caption of which rather astonishingly states, "It is unclear who, or what, has fashioned such creations."

Of course, matters could have been even worse, but *Science of the Supernatural* fails to live up to the promise implied by its subtitle: "Dare to Discover the Truth." One must hear therein an echo of Jack Nicholson's character in *A Few Good Men*: "The truth! You can't handle the *truth*!" For here, in a slick, colorfully illustrated book-azine, is the disappointing attempt to force science to share legitimacy with its polar opposite, the imaginary realm of the supernatural. It is a cynical compromise that ignores critical facts leading to an enlightened view. However much some wish otherwise, we live entirely in a real and natural world. ■

Joe Nickell, PhD, is CSI's senior research fellow. He is the author, coauthor, or editor of nearly fifty books.

Never Mind

Peter Kassan



The Feeling of Life Itself: Why Consciousness Is Widespread but Can't Be Computed. By Christof Koch. MIT Press, 2019, ISBN: 978-0-262-04281-9. 257 pp. Hardcover, $27.95.

In 2003, billionaire Paul Allen—best known for not being Bill Gates—founded the Allen Institute for Brain Science, which has done, and continues to do, important work. In 2011, Christof Koch, then a professor at the California Institute of Technology, joined the Institute as its chief scientist, becoming its president in 2015. Koch is the author of over 300 papers and four previous books (two of which are on the subject of consciousness).

Does such an impressive background, training, and experience equip someone to solve the conundrum of consciousness? Apparently not.

As Koch acknowledges in his book *The Feeling of Life Itself*, the problem of consciousness (a.k.a. the mind-body problem) has puzzled thinkers for millennia. Koch tells us that the problem "formerly the sole province of philosophers, novelists, and moviemakers" (Really? Not also theologians, poets, songwriters, psychologists, and cognitive scientists?) is now being addressed by scientists. Well, yes, addressed—but not actually solved. Koch has married two very different works—one scientific, the other wildly speculative—and used the former to lend credibility to the latter. But the marriage is a bad one.

In the scientific part, Koch states the by now uncontroversial principle *no brain, no mind*. Koch also acknowledges that, as he quotes Theodosius Dobzhansky, "Nothing in biology makes sense except in the light of evolution." One would think, then, that consciousness—which as far as we can tell occurs only in animals with a nervous system more or less like ours—can also be understood only in the light of evolution. But no.

In the speculative part, Koch suggests that a single bacterium or even a single atom may have a mind. He predicts that someday we'll have a consciousness detector like the one in *Star Trek*. For organisms with brains, this is conceivable even if highly unlikely. But the notion that we would ever have one for bacteria or atoms is, like *Star Trek*, pure science fiction. And could we ever ask a bacterium to describe its conscious experience so we could confirm the device's reliability? I doubt it.

Does such an impressive background, training, and experience equip someone to solve the conundrum of consciousness? Apparently not.

The scientific part of the book provides a fairly conventional introduction to brain anatomy, neurophysiology, and the quest for the neural correlates of consciousness, a pursuit in which Koch has been a central figure. This research has already had concrete clinical benefits, especially in assessing whether apparently unresponsive patients are brain dead or actually conscious.

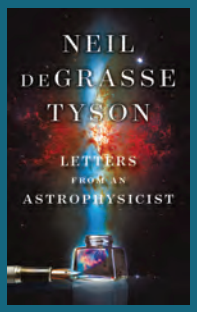
But even here, Koch goes far beyond current clinical evidence to suggest that if two brains could be suitably connected, the individual minds would disappear and a new mind would abruptly appear. Other speculations are even more extreme.

In getting to his boldest claims, Koch begins Chapter 1 with a phenomenological description of his experience of consciousness. At the very end of the chapter, he summarizes his introspection by stating that "Every conscious experience exists for itself, is structured, is the specific way it is, is one, and is definite."

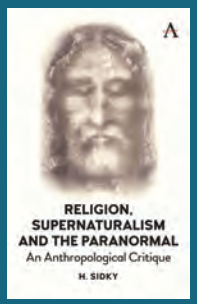
He follows this, with apparent modesty, with "So that's how it is for me. How is it for you?" Well, aside from the fact that I find his distillation mostly unintelligible, I'd say that for me consciousness has many other properties—it's always *local*; it's always temporally *immediate*; it always includes my point of view or *perspective*; it's always *embedded* both in my body and my physical environment; and it always has specific *content*. How is it for you?

NEW AND NOTABLE]

Listing does not preclude future review.



LETTERS FROM AN ASTROPHYSICIST. Neil deGrasse Tyson. Here is a collection of 101 letters (some paraphrased) Tyson has received and his answers to them. As a highly visible scientist with a huge presence on television and social media, he hears from a lot of people. Tyson calls the book a "vignette of the wisdom I have mustered to teach, enlighten, and ultimately commiserate with the curious mind." Significant parts of this very readable book are of particular interest to fellow skeptics. In sections on "Extraordinary Claims," "Hate Mail," "Science Denial," and "To Believe or Not Believe," for instance, Tyson directly answers fans' (or critics') questions on everything from ETs, aliens, and UFO sightings to worries and misconceptions about the end of the world, faces on Mars, psychic teleportation, perpetual motion, Bigfoot, the sixth sense, climate change, evolution, and God and religion. It's a good guide for other scientists and skeptics who deal with the public. Tyson manages to respond thoughtfully and clearly, with empathy yet always in defense of good science, clear thinking, and informed skeptical inquiry. W.W. Norton, 2019, 247 pp., $19.95.



RELIGION, SUPERNATURALISM, THE PARANORMAL, AND PSEUDOSCIENCE: An Anthropological Critique. H. Sidky. Sidky, the professor of anthropology (Miami University, Ohio) who wrote our cover article "The War on Science and Knowledge," March/April 2018, here provides a massive, book-length critique of "the scary and confusing 'post-truth' era of disinformation, 'fake news,' 'counter knowledge,' 'weaponized' conspiracy theories, magical thinking, and sheer irrationalism" we now live in. In his words, "It is an effort to subject the entire range of contemporary supernatural and paranormal 'truths' and religionist postulates on offer to unremitting critical scrutiny and skeptical analysis *as comprehensively as possible* from the perspective of science and scientific anthropology." Many researchers treat paranormal and religious beliefs and practices separately. But in this book, Sidky treats religious, supernatural, and paranormal beliefs, including pseudoscientific theories based on the latter, as "interrelated and mutually supporting phenomena." Drawing upon his own scientific anthropological background and materials from a variety of other relevant fields, this book indeed does appear to be an unusually comprehensive treatment of paranormalism and religiosity. Anthem Press, 2020, 518 pp., $200.

THE SHROUD OF TURIN: The History and Legends of the World's Most Famous Relic. Andrea Nicolotti, translated by Jeffrey M. Hunt and R.A. Smith. Here is a welcome first English-language publication of a comprehensive, major history of the Shroud of Turin published in Italy in 2015 by a professor of the history of Christianity at the University of Turin. The last of the book's five sections deals with the past fifty years of new claims and scientific refutations in a clear, straightforward manner. Author Nicolotti is fully versed in the skeptical literature and presents it clearly and with supporting commentary. He reports the investigations of such prominent skeptics as Nickell, McCrone,

Koch's modesty turns out to be false, although he takes quite awhile to admit it. By Chapter 7, he's asserting that those five introspectively derived phenomenological aspects of consciousness identify its *necessary* and *sufficient* elements. He's got a theory of consciousness. Well, actually, it's not original to him—it was developed by Guilio Tononi (a professor at the University of Wisconsin). But Koch endorses it enthusiastically—in fact, it's "a first in the history of thought." (I don't think only a single exclamation point would be sufficient here, so I won't add any.)

That theory is called "integrated information theory" (IIT). This unfortunate coinage—Tononi's—would suggest that information theory (itself misnamed—information theory is actually a theory of signal transmission) has been integrated with some other theory or maybe just with itself. But no, IIT (as Koch almost immediately abbreviates it) is a theory of integrated information, whatever that may mean.

The problem of consciousness (a.k.a. the mind-body problem) has puzzled thinkers for millennia.

Those five properties are now treated as, in Koch's own words, *axioms*. As he says, "in geometric or mathematical logic, axioms are foundational statements that serve as a starting point for deducing further valid geometric or logical properties and expressions." But, as Koch himself explains elsewhere, science isn't deductive, it's abductive. Science has *principles* and *models* and even *dogmas* (such as the central dogma of molecular biology) but not *axioms*.

Koch makes the bald assertion that "any system that obeys these five axioms is conscious." And we're off to the races. The theory introduces a mathematical measurement, dubbed φ (phi), which can be calculated for any network of elements that cause changes in one another. The greater the φ, the greater the mind. He shows a diagram of only three elements capable of assuming only two states each that has a measurable amount of φ, so presumably three transistors wired together in such a way would have a mind. Because the three elements aren't connected to any others that could provide any input, what such a system would be conscious *of* is entirely unclear. (Apparently, it would have *pure* consciousness—about which more later.)

As long ago as 2015, mathematician Ronald Cicurel

and neurobiologist Miguel Nicolelis published a monograph titled *The Relativistic Brain: How It Works and Why It Cannot Be Simulated by a Turing Machine*. In the concluding chapter of that short work, they refer to the concept of φ as "leading Koch to a form of panpsychism." They go on to write:

> In our view, despite being an interesting concept, φ measures Shannon-Turing information and, as such, is not sufficient to justify the emergence of higher brain functions responsible for fusing, in a single picture, a continuous stream of sensory and mnemonic information.

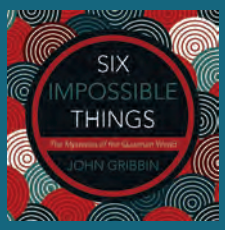
Koch asserts, without any clinical evidence, that somewhere in the brain's physical substrate of consciousness (which, as he explains, clinical evidence suggests is in the posterior cortex) will be found a set of neurons (or perhaps clusters of neurons) connected to each other like the three-element diagram. Remember, although he's been working on brains for a decade or two, he's not claiming that such a configuration has actually been found; he's just asserting that it *will* be.

Because he's elsewhere suggested that nothing else in a normal brain may be conscious, he's also claiming that almost certainly nowhere else in the brain would such a configuration exist. (The brain contains many tens of billions of neurons, each connected to many thousands of others. This nonoccurrence is hardly likely even from just a purely statistical viewpoint.) This despite the assertion that consciousness is, to quote the subtitle, "widespread" elsewhere.

Of the five axioms, one is first among equals: what he calls "intrinsic existence." Like "information theory" in "integrated information theory," this usage is eccentric. Rather than using *intrinsic* to mean "belonging to the essential nature or constitution of a thing," Koch uses it to mean that consciousness exists "for itself, without an observer." Leaving aside that consciousness is a *process* that *occurs* rather than a *thing* that *exists*, it's entirely unclear what this means. Again, from the Dobzhansky principle, consciousness hardly exists "for itself" but for animals to function more effectively in the world. But Koch makes this intrinsic existence something of a religious principle. In the chapter "Of Wholes," he gives the set of elements that bestows intrinsic existence to itself "the more poetic name the *Whole* [his emphasis] (with a capital W)." Like the word *God*, maybe?

In keeping with this religious spirit, Koch repeatedly refers to something he calls "pure consciousness" or "pure experience," explicitly invoking mystical states reported by practitioners of Buddhist meditation and the like. Koch describes his own experience in a sensory deprivation tank as being such a state. (If you can notice that you're in such a state well enough to report it later, is your consciousness really devoid of content?)

Although the book's subtitle asserts that consciousness isn't computable—that is, can't be created in a computer—and the book has a chapter titled "Why Computers Can't Experience," Koch claims that a "neuromorphic electronic device" (which he emphasizes would be nothing like today's Universal Turing Machine computers or even tomorrow's quantum computers) "could have human-level experience." Well, no. A computer, as Koch himself recognizes, is such only from the external perGove, and Garlaschelli, and of course the three-lab radiocarbon studies that definitively dated the shroud to medieval times (as skeptics had said it would). He regards the Shroud of Turin Research Project (STURP) and other defenders of the Shroud, who were media darlings in the 1970s and 1980s, as "authenticists," noting that STURP was made up of scientists who had an agenda to prove the shroud real, rather than acting with scientific objectivity. "One can understand why science looks at STURP's findings with great suspicion," he writes. "Though they act in good faith, sometimes scientists are able to find what they look for because they eagerly want to find it." Nicolotti says "sindonology," the "science" carried out by authenticists, "falls entirely into the category of pseudoscience." Baylor University Press, 2019, 524 pp., $59.95.



SIX IMPOSSIBLE THINGS: The Mystery of the Quantum World. John Gribbin. A physicist and veteran science writer, Gribbin provides a short introduction to six of the leading interpretations of quantum mechanics. "All of them are crazy, compared with common sense, and some are more crazy than others," he says but quickly notes that "in this world, crazy does not mean wrong … ." Quantum physics is indeed strange to us because we don't live in the quantum world, and it is still difficult to come up with a commonsense explanation of what is going on. ("Shut up and calculate" is the traditional mantra of scientists applying quantum knowledge.) He calls this short book "an agnostic overview" of some of the main interpretations. MIT Press, 2019, 90 pp., $19.95.

PLACEBOS FOR PETS? The Truth about Alternative Medicine in Animals. Brennen McKenzie, VMD, MSc. Veterinarians deal not just with animals but with people, writes McKenzie (who runs the *SkeptVet* blog), and that has forced him to learn about many of their interests, including complementary and alternative medicine (CAM). This is his critical look at the topic, including homeopathy, acupuncture, manual therapies such as chiropractic and "scientifically dubious physiotherapies," herbal medicines, dietary supplements, pet psychics, and many others. He begins with three pertinent questions: What is it? Does it work? Is it safe? His goal is to have patients and readers ask and answer these three questions for themselves. He describes what he has learned about alternative medical practices and how to evaluate new and unfamiliar treatment options. How well we do this determines the reliability of the answers we come up with, he emphasizes. At the end he says, "I'm placing [my bets] on science." Okham Publishing (UK), 2019, 481 pp., $17.99.

—Kendrick Frazier

spective of an observer. An electronic device—even a neuromorphic one—is no more intrinsically a computer than a mechanical clock is intrinsically an instrument to display the time and not, say, a child's wind-up toy.

Koch makes some other remarkable claims. He asserts that computers can't experience but they can be *genuinely* intelligent: "the tech industry will create, within decades, machines with human-level intelligence" and refers to this as the "birth of *true* artificial intelligence" (emphasis added). Again, no.

Koch is well aware of John Searle's famous Chinese Room argument that syntax is not semantics: a system that doesn't know what anything actually *means* (not in terms of still more symbols—words, usually—but in the world) can't do anything but *simulate* intelligence. Such a computer program will never have what we call *common sense*—the ability to recognize when one of its own conclusions is absurd. But Koch confines his discussion of this issue to a long footnote in which he attacks Searle for applying the Chinese Room to IIT itself. (Koch and Tononi have, he reports, met with Searle several times to explain the theory but without success.)

Koch makes this intrinsic existence something of a religious principle.

Koch also claims that consciousness might occur in a network of neurons grown in a Petri dish ("forming a mini-mind"), a single cell, or "perhaps even brute matter itself"—that is, a single atom. He suggests (by framing it as a rhetorical question) that integrated information theory has solved the mind-body problem. And, triumphantly, "Causal power of two kinds [the physical and that supposedly explained by IIT] is the only sort of stuff needed to explain everything in the universe. These powers constitute ultimate reality." Wow.

Crucially, even if it were true, IIT wouldn't actually explain *how* a system embodying his five axioms actually *causes* the experience of consciousness itself, much less its detailed contents—the qualia. Even if IIT could somehow be proved, the mechanism itself would still be utterly mysterious. It's a long way between determining that water is H_20 and demonstrating why such a molecule is a colorless liquid at room temperature, why it freezes and boils at the points it does, why it's less dense in the solid form than in the liquid, why it's a good solvent, and its many other properties.

On many subjects, Koch mostly displays the sort of skepticism one might expect from a working scientist. For example, he explains why quantum mechanics is unlikely to explain how the brain works. He dismisses panpsychism (other than IIT, that is) as "barren." His take on computationalism (the brain as computer) is good stuff. (His discussion of deep learning, however, is credulous and inadequate.)

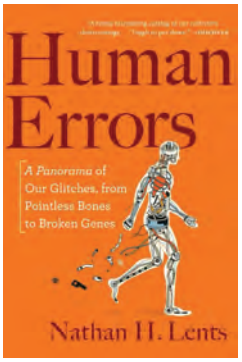
This book kept reminding me of *The Physics of Immortality* by Frank Tipler. If you're not familiar with that work, its subtitle is *Modern Cosmology, God and the Resurrection of the Dead.* (I have to admit that I didn't actually read that book, which is 560 pages long—I just paged through it in the bookstore in utter stupefaction.) At least *The Feeling of Life Itself* is (excluding the back matter) only 173 pages.

Koch has erected a remarkable edifice on a remarkably shaky foundation. He decries computationalism as consisting of "convenient but poor tropes" and being "ideology run amok." Both of these criticisms apply well to integrated information theory and the bizarre notion of intrinsic experience. ■

Peter Kassan has had a long career in the software industry where he has been a programmer, a technical writer, a manager, and an executive at a software products company. He holds several software patents. He has been an observer of the pursuit of artificial intelligence for some time and wrote "I've Got Algorithm. Who Could Ask for Anything More?" in our September/October 2018 issue.

Evolution's Flaws Are in Us

Harriet Hall



Human Errors: A Panorama of Our Glitches, from Pointless Bones to Broken Genes. By Nathan H. Lents. Boston, MA: Mariner Books, 2019. ISBN 9781328589262. 233 pp. Softcover, $15.99.

In *Human Errors*, Nathan H. Lents, a professor of biology at John Jay College, CUNY (and a speaker at CSICon 2019), has demonstrated that the human body can't possibly be considered the product of an intelligent designer. Rather, its flaws tell the story of evolution. No intelligent designer would have put our retinas in backward, left us with a stump of a tail, deprived us of the ability to make the vitamins and nutrients we need, or sent our recurrent laryngeal nerve on such a circuitous path. No intelligent designer would have filled our genomes with genes that don't work and viral carcasses of past infections. These and our many other defects can be explained only by the quirks of evolution.

Our defects fall into three categories: characteristics that evolved to facilitate our survival in a prehistoric world very different from the one we now live in; incomplete adaptations (for example, the knee is poorly adapted to bipedal posture); and defects that are

constrained by the limitations of evolution (we inherited structures that are horrendously inefficient but impossible to redesign through chance mutations). "Human anatomy is a clumsy hodgepodge of adaptations and maladaptations," Lents writes. He explains that mutations are random and often destructive but are also the source of all human greatness. He takes us on a grand tour of the human body and explains how its many imperfections came about. In the process, he teaches us much about evolution.

Thirty to 40 percent of Americans and Europeans and 70 percent of Asians require glasses or contact lenses. Nearsightedness occurs simply because the eye is too long; farsightedness because it is too short. Our night vision is very poor compared to that of cats. Cephalopod photoreceptors are installed in a more logical way, but the photoreceptors of all vertebrate eyes are installed backward; this was an evolutionary fluke that became perpetuated because redesigning it would have been next to impossible with random mutations.

Our nasal sinuses drain upward instead of downward, making us much more susceptible to colds and sinus infections than most other mammals. An intelligent designer would have taken advantage of gravity, as other mammals' sinuses do.

Because of a historical evolutionary accident, our recurrent laryngeal nerve loops under the aorta, following a circuitous path that is more than three times as long as it needs to be. The error originated in fish, which don't have necks and have a circulatory system very different from that of humans. This resulted in the absurdity of a five-meter-long nerve in giraffes and an even longer eight-to-ten-meter nerve in the dinosaur *Brachiosaurus*.

A shared tube for air and food predisposes us to choking. The anatomical adaptation to upright walking never quite finished in humans: our knees, ankles, and intervertebral discs are prone to injuries. Humans have too many bones, joints that don't flex, structures that aren't attached to anything, and appendages that cause more problems than they're worth. As Lents notes, "No robot arm will ever be designed to imitate our nonsensical bone structure."

Plants don't eat. Cows can live on grass alone. Dogs can thrive on dog food that contains only meat and rice. Most animals can make the nutrients that are lacking in their diet. Humans can't; we require a varied diet to supply us with vitamins and micronutrients. Humans used to be able to make vitamin C and still have all the necessary genes, but one of them is broken. Somewhere in our primate ancestors, the GULO gene suffered a random mutation. It didn't affect survival, because it happened in a part of the world where citrus fruits were widely available. The mutation was perpetuated and spread worldwide, leading to vitamin C deficiencies in areas without citrus fruits.

No intelligent designer would have filled our genomes with genes that don't work and viral carcasses of past infections.

We require a long list of vitamins, minerals, and trace metals in our diet that other animals don't need. We have contributed to our own deficiencies by ill-advised technological advances; we didn't realize that rice polishing would remove the vitamin B and cause beriberi. Iron deficiency is common: 50 percent of pregnant women and 40 percent of preschool children are anemic, and millions die from preventable iron deficiency each year.

Wild animals don't get fat but instead live on the verge of starvation. Humans in the developed world have access to plenty of food, and it's obesity that has become a problem. Obesity is caused by overeating, something evolution has programmed us to do. It was a fine strategy for our ancestors' hunter-gatherer societies when people gorged to compensate for periods of scarcity. "Obesity and type 2 diabetes are the quintessential evolutionary mismatch diseases, conditions that directly result from humans living in a very different environment than the one they evolved in," says Lents.

Vast expanses of our DNA have no function: they are *junk DNA*. Ninety-seven percent of human DNA is a blunder—and some of it is actually harmful. Even the functional genes are rife with errors: the DNA can be damaged by radiation or mutagens, and DNA copying errors are common. Mutations in the genes generally harm the offspring, but evolution has a blind spot. If a mutation causes harm late in life after the individual has reproduced, as in Huntington's disease, natural selection is powerless to stop it. We have almost as many pseudogenes and broken genes as functional ones. There are tradeoffs: the recessive sickle cell gene persisted because while inheriting two copies was disastrous, inheriting a single copy protected against malaria.

Eight percent of the human genome is made up of millions of carcasses of past infections with retroviruses, some dating back many hundreds of millions of years to our remote ancestors. A bizarre self-copying piece of DNA makes up over 10 percent of the genome. The transposable element *Alu* has infiltrated everywhere and taken on a life of its own. It wreaks havoc, but it also accidentally gave us color vision.

Humans don't reproduce well. Ovulation is hidden; sperm cells can't turn left; we are born too soon; and our enormous skulls cause difficulties with childbirth. Surely an intelligent designer would have developed a more efficient process than this.

We are prone to colds, gastroenteritis, allergies, and autoimmune diseases. Children are born with malformed

hearts. And if we live long enough, there is a 100 percent chance that we will get cancer. Lents writes that "Evolution cares little about the individuals who will die of cancer. This is a sacrifice worth making for the diversity that comes from mutations."

"Human anatomy is a clumsy hodgepodge of adaptations and maladaptations," Nathan Lents writes.

The human brain can't comprehend large numbers; we are easily fooled by optical illusions; and our memories are frequently wrong. We are frequently confused, tricked, distracted, and subject to cognitive bias and confirmation bias. We fall for fallacies such as the gambler's fallacy and the sunk-cost fallacy. We are unduly sensitive to anecdotes. We have dual human natures: we are both Jekylls and Hydes. We can switch from self-sacrifice to murder in a heartbeat.

This is a fascinating, entertaining, easy-to-understand book that explains the complicated story of evolution. Lents makes it clear that the design of the human body is not "intelligent" but is full of errors produced by the constraints and accidents of evolution. Nevertheless, we manage quite well. Our imperfections are a testament to the greatness of our species because we are so good at getting around them. Where will evolution and technology take us from here? That remains to be seen. ■

This review is adapted from one that was previously published on the *Science-Based Medicine* blog at https://sciencebasedmedicine.org/human-flaws-demonstrate-evolution-not-intelligent-design/.

Harriet Hall, MD, also known as the "SkepDoc," is a SKEPTICAL INQUIRER columnist and contributing editor. She is a CSI fellow.

[LETTERS TO THE EDITOR

Skeptical Inquirer
Dubious Claims in Youth Psychotherapy
Millennials and Post-Millennials: Dawning of a New Age?
Electrohypersensitivity: Syndrome or Phobia?
Religious Belief from Dreams?
God Plays with Atoms
RNA and the Prebiotic World

Climate Tribalism?

Matthew Nisbet asserts that "today's ubiquitous branding of Republicans as the party of 'denial' greatly exaggerates the intensity of opposition to climate and clean energy solutions among those on the center right. …" ("Against Climate Change Tribalism: We Gamble with the Future by Dehumanizing Our Opponents," January/February 2020). This statement is irrelevant even if true: the "center right" does not control the national Republican party, which is in thrall to a hard right coalition of racists, nationalists, evangelicals, and business interests who adamantly oppose taking action to remedy climate change. As a result, we have a Republican president who is gutting environmental regulations and has begun the process of withdrawing the United States from the Paris Agreement on climate change mitigation, as well as a Republican congressional delegation that has very largely supported these moves.

The majority of Americans think that climate change should be addressed "right now" (see www.cbsnews.com/news/cbs-news-poll-most-americans-say-climate-change-should-be-addressed-now-2019-09-15/). The "further dialogue" with climate change opponents that Nisbet supports will not result in immediate action on climate change. This action will occur only if the majority who favor it vote for candidates who recognize the problem and are willing to support measures to fix it.

Barry Wolf
Los Angeles, California

A check of Kalmoe and Mason (2019), which was reported on in *The New York Times* and can be read in full online, states that "in two nationally representative surveys, we find large portions of partisans embrace partisan moral disengagement (10–60%) *but only small minorities* report feeling partisan *schadenfreude* or endorse partisan violence (5–15%)." Furthermore, the authors report that "partisanship was measured with a 7-point response scale ranging from strong Democrat to strong Republican, plus other/don't know options. *We treated party categorically as Democrat or Republican, including 'leaners.'*" A better gauge of partisanship would have been the presidential election results of 2016: of eligible voters, approximately 23.7 percent voted for Trump, 24.8 percent for Clinton, and 51.5 percent for other candidates *or not at all.* For these reasons, I think Nisbet exaggerated the significance of Kalmoe and Mason's findings.

Decrying the dehumanization of opponents is certainly commendable, but when it comes to human contributions to global warming, no change will occur as long as fossil fuel producers and users are not compelled to change their behaviors. The simple fact is that, at present, almost all the elected politicians protecting the status quo in the United States are Republicans. Criticizing *The Washington Post* and *The Guardian* for saying as much, as Nisbet does, is unfair.

J.M. Unger
Emeritus Professor
The Ohio State University

Regarding Matthew Nisbet's analysis of political polarization and climate change tribalism, I am concerned that Nisbet truncated the "Robbers Cave" study strategy by omitting its primary focus. In the 1954 experiment, Muzafer Sherif directed a classic study in which the objective was "the reduction of intergroup friction and conflict" reviewed in the text *An Outline of Social Psychology*, revised edition by both Muzafer Sherif and Carolyn Sherif (1956, 301–328). Following a stage in which two competing groups of adolescents were in conflict, "superordinate goals" were introduced requiring the cooperation of both groups for their accomplishment. For example, a rope previously used for competitive tug-of-war games was retrieved to free a stalled truck that brought food to the adolescent campers. Pulling the bumper-attached rope required the combined effort of both groups to move the truck. After several such superordinate goals prompted cooperation, the boys also showed increased evidence of friendship. Unfortunately, climate change improvement as a superordinate goal has not done the same for this existential conflict.

While Nisbet cautions that tribalism among Democrats and

Republicans is current, namely, "The best educated and informed partisans tend to be the most intensely tribal …," improvement in climate change such as attention to the Green New Deal has been stifled due to this bipolar congressional rigidity. A plea for hometown neighborhood conversation regarding climate change to increase commonsense solutions for "energy decarbonization" is urged by Nisbet. Yet thus far, with some notable exceptions, the null hypothesis cannot be rejected.

William F. Vitulli
Professor Emeritus of Psychology
University of South Alabama
Mobile, Alabama

Millennials in Transition

This is a brief fact-check request regarding the comment that "The millennials have felt the impact of the Great Recession and have fewer financial resources compared to generations that preceded them" (Jeanne Goldberg, "Millennials and Post-Millennials—Dawning of a New Age?" January/February 2020, 43).

The facts are quite different. The millennials are even now beginning to receive, from their immediate ancestors in the greatest and silent generations, what the *Wall Street Journal* has frequently headlined as "the largest inter-generational transfer of wealth in history," based on present U.S. household net worth totaling over $100 trillion. They presently have a lot more than we did at comparable median age.

With the U.S. population at 320 million and median household size at 3.2, it's statistically safe to conclude that, as the two bequeathing generations depart, all that savings and investments will go to the X's and M's, 100 million households, from the $100 trillion total, or $1 million per household on average. Of course, it won't go out that evenly, and with about half of all U.S. households with equity investments and savings, it is safe to say that it will go primarily to their children.

We silents were not nearly so well endowed by our parents. Yes, the M's have had stresses we didn't have: e.g., high college tuitions and health care. They can't very well complain about housing costs; as another *WSJ* chart has shown, the median single family house value today, adjusted for inflation, is just about what it was a century ago—and the modern version is a lot larger and better mechanically equipped.

Martin A. Harris Jr.
Consultant and columnist
Jonesborough, Tennessee

Jeanne Goldberg responds:

I find Martin Harris's letter interesting, but I feel the portrait of millennials' financial status, currently and in the future, is much more complicated. So many other factors are involved such as the longevity of boomers (and greatest and silent generations!), thereby lessening the amount of inheritances and also delaying the time that millennials receive the inheritances; the inequality gap among earlier generations, with just about half owning equities to pass on, thereby perpetuating inequality in the millennial generation; the expanding need for health care (nondiscretionary) expenditures among earlier generations, and also the prevalent discretionary spending habits of boomers for travel, hobbies, and other luxuries.

God and Atoms

Regarding Stanley Rice's article "God Plays with Atoms" ("Creationist Funhouse, Episode Three," January/February 2020). A substantial fraction of the readers of these pages are teachers who are interested in the facts surrounding the Creation dispute as well as effective ways of presenting a scientific perspective on it. Professor Rice has the factual part down pat. However, his pedagogy leaves much to be desired.

Committed creationists are unlikely to be persuaded by the evidence or by explanations of the underlying flaws in their reasoning. It is the uncommitted students that teachers can influence. After sixty years of teaching the subject to freshmen, I can tell you with high confidence that ridicule and dismissiveness don't help. Dr. Rice's beginning students would mostly be much more receptive to the compelling evidence he has at hand if he would simply present it directly without editorializing.

For instance, when I start this section of the discussion, I write on the board (yes, some of us still use black boards), "When the things I see disagree with the things I think, I gotta change what I think." That little sentence encapsulates observability, testability, and falsifiability. The rest can be couched in terms of an inquiry that emphasizes good scientific practice. The method also has the virtue of keeping the adrenalin levels lower.

Jim des Lauriers
Claremont, California

Stanley Rice replies:

I want to thank Jim des Lauriers for the letter. He is entirely correct that the approach I use in my Skeptical Inquirer *articles is unsuitable for teaching high school or freshman students. I do not use this approach even when I teach college seniors, much less freshmen. Just this morning, I taught a class about some positive influences of religious thought on the development of science. I intended my article for my fellow skeptics who have already heard the evidence and might appreciate a humorous approach to it. I want to make you laugh, then make you think. Again, thanks for the letter.*

Students' Learning Styles

Ms. Viskontas (and others in previous articles denigrating teaching to a student's learning style) thoroughly misunderstands the classroom applications of this technique ("Dubious Claims in Psychotherapy for Youth, Part 1," January/February 2020). In practice, a good teacher teaches material through several different approaches. This is because not all students learn best in one particular manner. Some learn with lots of visual aids, some learn with hands on activities, some learn with a lot of guided practice, etc. Most learn better when taught in a method addressing their preferred learning style.

She seems to insist that it should be hard for a student to acquire knowledge. In my experience as one who has won national honors as a high school science teacher, the easier I can make it for students to learn, the deeper will be their learning and the more complex the problem solving they'll be able to do. I endeavor to address all student learning styles, and I've had great success not only with classroom and standardized test achievement but with later college successes.

Kathy Crandall
Los Angeles, California

Icelandic Explorers to America

Brian Regal's article "Everything Means Something in Viking" (November/December 2019) contains some questionable statements. To quote: "The idea that Leif Eriksen discovered America was, and still is, a desperate claim that America, as well as the United Kingdom and Western Europe in general, is a whites-only homeland settled right from the start by Nordic supermen … The particular Leif Eriksen story of Vinland has no supporting evidence. It is a wish-fulfillment fantasy to satisfy a troubling emotional need for everything to mean something in Viking."

The relevant accounts are preserved in the Icelandic sagas. The name of the explorer was Leifr Eiríksson, or Leifur Eiríksson in modern Icelandic spelling. Eiríksson was an Icelander, born around 970 AD. His father, Eiríkur rauði (Eric the Red), was a Norwegian who, after being exiled from Iceland, spent three years exploring Greenland and established two colonies on the west coast. His son, Leifur, was an explorer and a missionary, not a warrior or a Viking. The accounts in the Icelandic sagas of his travels to the American continent are detailed, wholly believable, and not inconsistent with archaeological findings. Eiríksson was followed by other Icelanders who attempted to establish a settlement on coastal North America. This story, studied by scholars and taught in schools, has nothing to do with Nordic supermen or Vikings.

Thorsteinn Saemundsson
Reykjavik, Iceland

Origins of Religious Belief

Zeigler's "Religious Belief from Dreams?" (January/February 2020) adds another element to the origin of religiosity in our species. But can the placebo effect also play a role? Our species' cognitive skills present us with the question of our mortality, and as religious history supports, initially only kings and rulers seemed to survive death via building of pyramids (or hundreds of terracotta warriors as found in China) to provide their future needs. Then religion evolved—surprise—to provide everyone with the opportunity for eternal life by accepting the beliefs.

A version of this is the widespread cultural placebo effect found today. This effect is known to be activated in approximately 30 percent of patients when deceived by administering sugar pills to cure them. When patients are very involved physically and emotionally in preparing for health problems such as surgery for a cardiac stent, the beneficial effects go up to 100 percent! This finding in a ten-year British study (*Lancet*, volume 391, issue 10115, pp. 31–40, January 6, 2018) found that in both control (N=105) and placebo (N=95) stent surgeries (all processes except placing the stent), groups had no difference in outcomes six weeks post-surgery in double blind evaluations. One's role in the health process has been repeated, finding that greater involvement (pills vs. surgery) equals greater acceptance of the falsehood that the placebo will work.

Is it the same cognitive ability that allows for both acceptance of a placebo for health and a religious belief of a soul spirit forever in heaven?

Rodney Sobieski
Emporia, Kansas

Pharmacy and Smart Pills

I have always respected the work of Dr. Harriet Hall. However, her recent column on smart pills ("Smart Pills? Beware the PIED Piper," January/February 2020) was filled with insults to pharmacy that I found profoundly disheartening.

First, she quoted the claim that pharmacists recommended Prevagen over all other memory aids. Did she take any time to find out how many, if any, pharmacists were actually consulted? How many times have you seen a business claiming they had the best of some product, without any citation?

Second, and most distressing, was her claim that the average pharmacist can't be trusted to be scientifically accurate and ethical, based on the homeopathic remedies on the shelves of large chain pharmacies. I believe you will find that pharmacists have very little say as to what is on the over-the-counter shelves. I worked in a small retail pharmacy and would constantly find homeopathic medications placed there by the pharmaceutical wholesaler we used. They were immediately pulled for return, but that didn't stop them from doing the same thing the next time they checked our shelves. Making assumptions without solid data is not the mark of a good scientist.

Patricia Hoppe, PharmD
Ontario, California

Harriet Hall, MD, responds:

I had no intention of insulting pharmacy in my article. What I said was, "If pharmacists are recommending it [Prevagen], they shouldn't be, because it doesn't work." And that's only consistent with pharmacy's own code of ethics, which requires them to practice in accordance with scientifically acceptable data.

The claim that Prevagen is the number one pharmacist-recommended memory support brand is based on a survey of pharmacists published online in the 2019 Pharmacy Times*, which reaches over 1.3 million retail pharmacists. It tallied 550,210 recommendations per month for over-the-counter products, and of the recommendations for memory support products, 72 percent of them were for Prevagen. The survey did not specify the number of pharmacists who recommended it, but if even one is recommending it, isn't that too many?*

The McGill Office for Science and Society recently surveyed 150 Montreal pharmacies and found that two-thirds of them stocked the homeopathic flu remedy Oscillococcinum. In the other third, some employees apologized for not stocking it or offered to refer the caller to a naturopath.

Can the average pharmacist be trusted to be scientifically accurate and ethical? Obviously not all of them can. How many can? I couldn't find any data on that. If you pick one at random, there's no guarantee. That's what I meant when I said "the average pharmacist"; perhaps I should have worded it better. But even if the statistically "average" pharmacist can be trusted, how could you trust one you picked at random?

Over-Populated Planet

Regarding Kendrick Frazier's article "Hot Month, Hot Year, Hot Planet" (November/December 2019), it seems that all the world's media have focused on climate change. Excessive human birthing is ignored. I suggest you shame the world's media into diverting their focus from climate change to this horrendous population explosion and join hands with CAPS of California, Population Connection, NPG, and other population stabilization groups throughout the world.

Climate change is an effect, not the cause, and the cause is ignored. Everyone profits from personal or business growth in human numbers. Every mayor in the world hustles for population growth. Their reward is more taxes, new customers for industry. Religions are the prime cause of this excessive birthing. Forests and fish are disappearing. Our fertile farms that once grew produce for the people are now growing houses for the new billions arriving upon earth.

Of course, there is climate change; more than seven billion humans are gobbling up earth's resources.

Scott Austin Hunter
Phoenix, Arizona

For the Record

Some changes made during late production of the March/April 2020 issue unfortunately resulted in some errors.

The paragraph at the bottom of p. 16 should read: "False and fallible memories are bad enough, but today the situation has worsened with the prevalence of digitally doctored photos and fake news. Computer programs can now make anyone be saying anything you want."

The sentence beginning at the bottom of p. 23 should read: "With the most damaging evidence excluded, Lizzie choosing not to testify this time, and there being public sentiment for what the *New York Times* called 'this unfortunate and cruelly persecuted woman,' the jury took just over an hour to acquit her on June 20, 1893 (Pearson 1987, 253, 263; Kurland 1994, 48–49)." *A line was also duplicated on pp. 24–25.*

We regret the errors.

[FEEDBACK

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words**. Due to the volume of letters we receive, not all can be published. Send letters as email text (not attachments) to letters@skepticalinquirer.org. In the subject line, provide your surname and informative identification, e.g.: "Smith Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122.

Committee for Skeptical Inquiry

Scientific and Technical Consultants

Gary Bauslaugh,
writer and editor,
Victoria, B.C., Canada

Richard E. Berendzen,
astronomer, Washington, DC

Martin Bridgstock,
senior lecturer, School of Science,
Griffith Univ., Brisbane, Australia

Richard Busch,
magician/mentalist, Pittsburgh, PA

Shawn Carlson,
Society for Amateur Scientists,
East Greenwich, RI

Roger B. Culver,
prof. of astronomy, Colorado State Univ.

Felix Ares de Blas,
prof. of computer science,
Univ. of Basque, San Sebastian, Spain

Nahum J. Duker,
assistant prof. of pathology,
Temple Univ.

Taner Edis,
Division of Science/Physics
Truman State Univ.

Barbara Eisenstadt,
psychologist, educator, clinician,
East Greenbush, NY

William Evans,
prof. of journalism and
creative media, Univ. of Alabama

Bryan Farha,
prof. of behavioral studies in
education, Oklahoma City Univ.

John F. Fischer,
forensic analyst, Orlando, FL

Eileen Gambrill,
prof. of social welfare,
Univ. of California at Berkeley

Luis Alfonso Gámez,
science journalist, Bilbao, Spain

Sylvio Garattini,
director, Mario Negri Pharmacology
Institute, Milan, Italy

Laurie Godfrey,
anthropologist, Univ. of Massachusetts

Gerald Goldin,
mathematician, Rutgers Univ., NJ

Donald Goldsmith,
astronomer; president, Interstellar Media

Alan Hale,
astronomer, Southwest Institute for Space
Research, Alamogordo, NM

Clyde F. Herreid,
prof. of biology, SUNY Buffalo

Gabor Hrasko,
chairman of the European Council of
Skeptical Organizations (ECSO), president
of Hungarian Skeptics

Michael Hutchinson,
author; Skeptical Inquirer
representative, Europe

Philip A. Ianna,
assoc. prof. of astronomy,
Univ. of Virginia

I.W. Kelly,
prof. of psychology, Univ. of Saskatch-
ewan,
Canada

Richard H. Lange,
MD, Mohawk Valley Physician
Health Plan, Schenectady, NY

William M. London,
California State Univ., Los Angeles

Rebecca Long,
nuclear engineer, president of Georgia
Council Against Health Fraud, Atlanta, GA

John R. Mashey,
computer scientist/executive (Bell
Labs, then Silicon Valley), analyst of
climate-change denial, contributor to
DeSmogBlog and Skeptical Science,
Portola Valley, CA

Thomas R. McDonough,
astrophysicist, Pasadena, CA

James E. McGaha,
astronomer, USAF pilot (ret.)

Joel A. Moskowitz,
director of medical psychiatry, Calabasas
Mental Health Services, Los Angeles

Matthew C. Nisbet,
professor of communication studies,
public policy, and urban affairs at North-
eastern University

Julia Offe,
neurobiologist, science journalist, creator
of German Science Slam

John W. Patterson,
prof. of materials science and
engineering, Iowa State Univ.

James R. Pomerantz,
prof. of psychology, Rice Univ.

Tim Printy,
amateur astronomer, UFO skeptic, former
Navy nuclear reactor operator/division
chief, Manchester, NH

Daisie Radner,
prof. of philosophy, SUNY Buffalo

Robert H. Romer,
prof. of physics, Amherst College

Karl Sabbagh,
journalist, Richmond, Surrey, England

Robert J. Samp,
assistant prof. of education and
medicine, Univ. of Wisconsin-Madison

Steven D. Schafersman,
asst. prof. of geology, Miami Univ., OH

Chris Scott,
statistician, London, England

Stuart D. Scott Jr.,
associate prof. of anthropology,
SUNY Buffalo

Erwin M. Segal,
prof. of psychology, SUNY Buffalo

Carla Selby,
anthropologist / archaeologist

Steven N. Shore,
prof. of astrophysics, Univ. of Pisa, Italy

Waclaw Szybalski,
professor, McArdle Laboratory, Univ.
of Wisconsin–Madison

Sarah G. Thomason,
prof. of linguistics, Univ. of Pittsburgh, PA

Tim Trachet,
journalist and science writer, honorary
chairman of SKEPP, Belgium

David Willey,
physics instructor, Univ. of Pittsburgh, PA

CENTERS FOR INQUIRY

www.centerforinquiry.org/about/branches

United States Branches

CFI Austin
Austin, Texas (512) 454-0977
austin@centerforinquiry.org

CFI Indiana
350 Canal Walk, Suite A
Indianapolis, Indiana 46202
(317) 423-0710
indy@centerforinquiry.org

CFI Long Island
Long Island, NY
(631) 793-9382
li@centerforinquiry.org

CFI Michigan
3777 44th Street SE, Grand Rapids, MI 49512
(616) 698-2342 michigan@centerforinquiry.org

CFI New York City
P.O. Box 26241, Brooklyn, NY 11202
nyc@centerforinquiry.org

CFI Northeast Ohio
PO Box 2379, Akron, OH 44309
(330) 798-0843
neohio@centerforinquiry.org

CFI Portland
PO Box 3378, Portland, OR 97208
(503) 593-7904
portland@centerforinquiry.org

CFI San Francisco
San Francisco, CA, sf@centerforinquiry.org

CFI Tampa Bay
Box 139 c/o O'Keefe
4011 S. Manhattan Ave., Tampa, FL 33611-1265
tampa@centerforinquiry.org

CFI Washington DC
1012 14th St. NW, Suite 205, Washington, DC 20005
(202) 733-5279 ext. 200
dc@centerforinquiry.org

CFI West
2535 W. Temple St, Los Angeles, CA 90026
(323) 666-9797, la@centerforinquiry.org

CFI Western New York
1310 Sweet Home Road, Amherst, NY 14228
(716) 636-4869 ext. 402
wny@centerforinquiry.org

International Branches

CFI Argentina
Los Antiguos, Santa Cruz Province,
Argentina
Alejandro Borgo
alejandroborgo@gmail.com

CFI Canada
PO Box 24006
Hazeldean RPO
Ottawa, ON
K2M 2C3
(613) 663-8198
info@centerforinquiry.ca

CFI China
China Research Institute for Science
Population
NO. 86, Xueyuan Nanlu Haidian Dist.
Beijing, 100081 China
8610-62170515
Zheng Nian
nzhjx@yahoo.com.cn

CFI France
Universite of Nice
Faculte Des Sciences
Parc Valrose, 06108
Nice Cedex 2, France
+33-489.15.02.28 (only on Wed. p.m.)
Henri Broch
Henri.Broch@unice.fr

CFI Kenya
Center For Inquiry–Kenya
United Youth Group House, Wing B
Makadara, Jogoo Road
Kenya
George Ongere
geongere@yahoo.com

CFI Peru
Calle El Corregidor 318
Urb. El Manzano, Rimac
Lima 25-PERU
Manuel Paz y Mino
humanarazon_peru@yahoo.com

CFI Poland
01-876 Warszawa
Ul. Broniewskiego 99/147
Poland
Andrzej Dominczak
dominiczak@wp.pl

CFI Spain
Madrid, Spain
Luis Alfonso Gamez
lgamez@terra.es

cfi CENTER FOR INQUIRY

CSICON 2020
THE CONFERENCE DEDICATED TO SCIENCE AND REASON
OCTOBER 15–18, 2020 | WESTGATE HOTEL | LAS VEGAS
WHERE THE STARS OF SCIENCE AND REASON SHINE
NEIL DEGRASSE TYSON
SASHA SAGAN
PENN & TELLER
RICHARD DAWKINS
NEVADA
FEATURING: PAUL OFFIT JULIA SWEENEY LEIGHANN LORD PIFF THE MAGIC DRAGON
SUSAN GERBIC RICHARD WISEMAN SEEMA YASMIN AND MORE!
CALL FOR PAPERS
The Sunday Morning Papers session will recognize new voices and new ideas and showcase them in the spotlight of the CSICon stage. If you have had success in communicating scientific skepticism, teaching critical thinking, combating pseudoscience, or furthering the mission of CSI in some new and significant way, we want to hear from you!
Email sundaypapers@csiconference.org for more details.